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History without Time

Buffon's Natural History as a Nonmathematical Physique

*By Thierry Hoquet**

ABSTRACT

While “natural history” is practically synonymous with the name of Buffon, the term itself has been otherwise overlooked by historians of science. This essay attempts to address this omission by investigating the meanings of “physique,” “natural philosophy,” and “history,” among other terms, with the purpose of understanding Buffon’s actual objectives. It also shows that Buffon never claimed to be a Newtonian and should not be considered as such; the goal is to provide a historical analysis that resituates Buffon’s thought within his own era. This is done, primarily, by eschewing the often-studied question of time in Buffon. Instead, this study examines the nontemporal meanings of the word “history” within the naturalist’s theory and method. The title of his *Natural History* is examined both as an indicator of the kind of science that Buffon was hoping to achieve and as a source of great misinterpretation among his peers. Unlike Buffon, many of his contemporaries actually envisioned the study of nature from a Baconian perspective where history was restricted to the mere collection of facts and where philosophy, which was the implicit and ultimate goal of studying nature, was seen, at least for the present, as unrealizable. Buffon confronts this tendency insofar as his *Histoire naturelle* claims to be the real physique that, along with describing nature, also sought to identify general laws and provide clear insight into what true knowledge of nature is or should be. According to Buffon, history (both natural and civil) is not analogous to mathematics; it is a nonmathematical method whose scope encompasses both nature and society. This methodological stance gives rise to the “physicization” of certain moral concepts—a gesture that was interpreted by his contemporaries as Epicurean and atheist. In addition, Buffon reduces a number of metaphysically tainted historical concepts (e.g., antediluvian monuments) to objects of physical analysis, thereby confronting the very foundation of natural

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theology. In Buffon, as this essay makes clear, natural history is paving the way for a new physique (science of natural beings), independent from mathematics and from God, that treats *naturalia* in a philosophical and “historical” manner that is not necessarily “temporal.”

WHAT WAS NATURAL HISTORY and how was it to be understood in its eighteenth-century context? Most of the time “natural history” was understood as the science of “*naturalia*”—that is, the study of the three kingdoms of nature (mineral, vegetable, animal). Georges-Louis Leclerc, comte de Buffon, and his monumental *Histoire naturelle* (thirty-six volumes published between 1749 and 1789) are generally seen as synonymous with such a project. (See Figure 1.) In his *Prospectus* for the *Histoire naturelle*, published in 1748, Buffon implicitly endorsed this view: in theory, the *Histoire naturelle* was supposed to amount to no more than a description of the Cabinet du Roi, the complete scope of which was intended to run to nine volumes for the animal world, three for the plant world, and three for the mineral world. Buffon, of course, was sorely mistaken in his estimates. His first fifteen volumes, far from encompassing the totality of nature, went no further than the mico, a little monkey. Birds soon followed, filling another nine volumes (1770–1783); the mineral world required five volumes of its own (1783–1788), which were published concurrently with the seven volumes of *Suppléments* to the first series (1774–1789).¹ But plants, insects, fish, and reptiles—to name but a few of the most conspicuous absences—remained out of reach for the *Histoire naturelle*, even though Buffon, working with many collaborators, dedicated his entire life to this project (the last volume was published posthumously). At the turn of the century, naturalists such as Bernard Germain Étienne Laville, comte de Lacépède (1756–1825), published “follow-ups” to Buffon (*Suites à Buffon*) to complete the *grand tableau*. Seen from this perspective, and taking into consideration that Buffon *et alia* sought to describe and identify the totality of nature along with the laws of natural processes, natural history could easily be taken for an ancestral form of biology, on the path toward its scientific form. The Bachelardian account of the life sciences accurately reflects this reality: to a certain extent, natural history was a kind of biology not yet entirely “purified” from the prejudices and errors of common opinion.²

To see natural history as a precursor to biological science is to confuse the real meaning of the word “science,” however. In the eighteenth century, “science” was often used in the plural—“sciences” (as in Académie des Sciences)—but in its singular form “science” was used to designate a complete body of knowledge. Another confusing word is the term “*philosophie*,” which was broadly understood to mean the complete system of knowledge that traditionally consisted of four parts: logic, metaphysics, physics, and ethics.

¹ Georges-Louis Leclerc, comte de Buffon, *Histoire naturelle*, 36 vols. (Paris: Imprimerie Royale, 1749–1789), Vols. 1–15: *Histoire naturelle, générale et particulière* (1749–1767); Vols. 16–24: *Histoire naturelle des oiseaux* (1770–1783); Vols. 25–29: *Histoire naturelle des minéraux* (1783–1788); Vols. 30–36: *Suppléments à l'Histoire naturelle* (1774–1789). Citations to the *Histoire naturelle* in this essay will use the overall volume numbers; the year of publication will be given the first time a volume is cited. All texts are available at www.buffon.cnrs.fr.

² Gaston Bachelard, *La formation de l'esprit scientifique: Contribution à une psychanalyse de la connaissance objective* (1938), 14th ed. (Paris: Vrin, 1989), p. 45: “Buffon’s *Histoire naturelle* could be reread with a more critical eye, observing the observer, adopting the attitude of a shrink in search of unreasoned reasons. It will then appear that the portrayals of the animals are structured by a false biological hierarchy, and are pervaded by the unconscious fantasy of the narrator.”



Figure 1. Portrait of Buffon (1761) by François-Hubert Drouais (1725–1775). © Musée Buffon, Montbard. Georges-Louis Leclerc, comte de Buffon (1707–1799), was a man of power. Although he devoted most of his life to writing and publishing the thirty-six volumes of his *Histoire naturelle*, he is often considered a popularizer of science. D’Alembert calls him “the great phrasemonger” (“le grand phrasier”), and Condorcet depicts him as a pompous poseur—“il mettait ses manchettes pour écrire”—a sentence taken up by Cuvier and by Flaubert in his *Dictionnaire des idées reçues*.

It is difficult to locate the place of natural history in the academic divisions of the eighteenth century. One can claim that natural history was already biological science in the making—but then where was this science to be found? Was it in the Jardin du Roi, founded in 1635 and largely devoted to the cultivation of medicinal plants? Or in the Académie Royale des Sciences, founded in 1666, where no section for “natural history” existed before 1785? Or in the Société Royale d’Agriculture de la Généralité de Paris, which was founded in 1761 but had no national standing until 1788? In short, there was no academy for natural history but, rather, several rival institutions, all treating the question of natural entities. So when the young Buffon, not yet a count but already the *Intendant* of the Jardin du Roi (a position he obtained when only thirty-two), published the first three

volumes of his *Histoire naturelle, générale et particulière*, in September 1749, it aroused great curiosity and even enthusiasm. Yet the book also disappointed its public.

Scholarship on Buffon has understood his conception of natural history in different ways. One influential thesis, dating at least to Samuel Butler's *Evolution, Old and New*, weaves a teleological narrative that casts Buffon as a figurehead leading to Darwin. This link is based on Buffon's alleged contribution to the "discovery of time," or, at least, his insertion of time into today's conception of nature.³ Pre-Darwinian or not, his *Natural History* has been understood as a temporal or dynamic history of nature. Not only does this interpretation seem anachronistic to me, but it conceals the methodological struggles separating historians, both civil and natural, from mathematicians.

More recently, from the perspective of the history of collections and scientific institutions, Buffon's work has been taken up as an example of a Latourian "center of accumulation." One can study his institutional position, his various sources, and the way he used the French colonies to establish an extended network of correspondents and informants. A third approach, linked to the second, would analyze Buffon in terms of the "cultures of natural history." From this point of view, Buffon's natural history is not only a theoretical endeavor or a contribution to the theory of generation: its mission overlaps with the production of the collection of *naturalia* held at the Cabinet du Roi. In other words, Buffon's work should be related to his "material practices," but also to some rhetorical models. These concepts have renewed and energized the whole scholarly approach to eighteenth-century natural history.

My point here is not to challenge such approaches, but my methodology and aims are different. I take a more traditional stance, working from the perspective of history of ideas but leaving aside much of the "whiggish" obsession with time. I believe that the words that were used by Buffon's contemporaries had an impact in intellectual debates. Names, especially when it comes to the names given to sciences by their practitioners, are not incidental: they function as flags or standards and they provide the guidelines for many discussions. This is why a re-examination of the term "*histoire naturelle*" seems so crucial, for Buffon indeed played with this concept—and, to a large degree, cheated. As we will see, the naturalist was merely expected to describe a collection; from such a perspective, "*histoire naturelle*" would seem a perfectly appropriate tag for his enterprise. But given the actual *telos* of his work, what Buffon meant by "natural history" was closer to the old Aristotelian "*physique*."⁴ There again, however, Buffon's controversial claim

³ Samuel Butler, *Evolution, Old and New; or, The Theories of Buffon, Dr. Erasmus Darwin, and Lamarck, as Compared with That of Mr. Charles Darwin* (London: Hardwicke & Bogue, 1879). The first attempt to eradicate what we might, following Joseph Clark, call this "precursitis virus" was J. S. Wilkie, "The Idea of Evolution in the Writings of Buffon," *Annals of Science*, 1956, 12:48–62, 212–227, 255–266; the phrase itself comes from Joseph T. Clark, "The Philosophy of Science and the History of Science," in *Critical Problems in the History of Science*, ed. Marshall Clagett (Madison: Univ. Wisconsin Press, 1959), pp. 103–140, on p. 103. Regarding the "discovery of time" see June Goodfield and Stephen Toulmin, *The Discovery of Time* (London: Hutchinson, 1965). Martin Rudwick refused to attribute the discovery of time to any "dead white male." Nevertheless, he devoted a section to "Buffon's cooling globe": Martin J. S. Rudwick, *Bursting the Limits of Time: The Reconstruction of Geohistory in the Age of Revolution* (Chicago/London: Univ. Chicago Press, 2005), pp. 139–150.

⁴ I use "*physique*" (Buffon's term) in the general sense of "the science of all natural beings," rather than "physics," which has a more restricted sense of "science of the laws of matter" (not necessarily including the organic realm). Besides, since there is no distinction between "*physique*" and "physics" in the French language, it doesn't help us to understand what Buffon had in mind. Likewise, the term "natural philosophy"—though it is commonly used in English—has also seemed inappropriate here, since "*philosophe naturel*" is not usual in French. Besides, one of the central aims of this essay is to clarify the relationship between history and philosophy.

against mathematical physique has to be explained: for if Buffon himself is expected to be a Newtonian, his physique should be mathematical.

To recover many of these debates, this essay examines the reactions of Buffon's contemporaries to what was considered a polemical use of the concept of natural history. Moreover, my analysis will interrogate the question of his supposed Epicureanism in an attempt to identify the epistemological meaning and implications of the terms "history," "philosophy," and "physique," as they were understood as controversial labels for a knowledge of natural things.

MISLEADING TITLE?

Buffon's *Natural History* was not recognized as a natural history. Its first readers and reviewers felt that they had been deceived by the title. Guillaume-Thomas Raynal (1713–1796) wrote in his *Nouvelles littéraires* for the year 1749: "All well considered, this book does not correspond to our expectations." Among the naturalists, Joseph-Adrien Lelarge de Lignac (1710–1762), a metaphysician who worked with René-Antoine Ferchault de Réaumur (1683–1757), also emphasized that there was a deep misunderstanding about the book's subject:

You are waiting impatiently, Monsieur, for the history of the King's Cabinet. You were expecting to read an ordered catalogue of all the wealth that Nature is spreading with profusion across the universe. This Cabinet is indeed a natural history of the kind you like. But you will not have its description, because that has not been published: we only have the preface of it, in three volumes in-4^o, and this preface contains the philosophical fancies of M. de Buffon, together with some anatomical pieces, added by M. Daubenton, in order to complete the third volume.⁵

Scholars and amateurs of natural history were disappointed by Buffon's work. Instead of a thorough and accurate description of the Cabinet du Roi, they found what they called "the philosophical fancies" of the *Intendant* of the Jardin du Roi.

For eighteenth-century readers, this disappointment stemmed from a discrepancy between the title and the content. This poses the question: Why did Buffon call his book *Natural History* if what he intended to do did not relate at all to what was understood by this title? The question is even more puzzling given that, as we know, he chose his title deliberately, writing to Jean Jalabert that he had finally decided to publish, not a "Catalogue du Cabinet du Roi," but a general "Natural History."⁶

The use of the short title *Natural History* was very common. It could allude to Aristotle's *History of Animals* or, *par excellence*, to Pliny's *Historia naturalis*, which presented a "universal history" and opened with a general description of the universe.⁷

⁵ Guillaume-Thomas Raynal, *Correspondance littéraire, philosophique et critique, par Grimm, Diderot, Raynal, Meister*, ed. Maurice Tourneux, 16 vols. (Paris: Garnier, 1877–1882), Vol. 1, p. 337; and Joseph Adrien Lelarge de Lignac, *Lettres à un Américain sur l'Histoire naturelle, générale et particulière de monsieur de Buffon*, 5 vols. (Hamburg, 1751), first letter, Vol. 1, pp. 1–2. See also the letter of Charles Secondat, baron de la Brède et de Montesquieu, to Monseigneur Cerati: "M. de Buffon just published three volumes, which are to be followed by twelve others: the first three volumes contain the general ideas." Quoted in Pierre-Marie-Jean Flourens, *Buffon, Histoire de ses travaux et de ses idées* (1844), 2nd ed. (Paris: Hachette, 1850), p. 283.

⁶ Georges-Louis Leclerc, comte de Buffon, to Jean Jalabert, 2 Aug. 1745, quoted in Buffon, *Oeuvres philosophiques*, ed. Jean Piveteau and Maurice Fréchet (Corpus Général des Philosophes Français: Auteurs Modernes, 41[1]) (Paris: Presses Univ. France, 1954), p. viii.

⁷ Pliny's first word, significantly, was "world" ("mundus"). The book had been translated into English as

According to the Plinian model, anyone who wrote a book bearing the title *Natural History* would have to consider the subject on a grand scale. This is precisely what Buffon did: he gave an account of the origin of the earth and all the other planets of the solar system, showing that they were somehow torn off as chunks, flung out of the sun by an errant comet's collision. This opening contrasted sharply with that of Abbé Pluche's best-selling work, the *Spectacle de la nature*.⁸ The *Spectacle* aimed to demonstrate the conformity between modern physique and the teachings of Moses for a wide popular audience. It started with a consideration of insect generation, discarding the idea of the spontaneous generation of vermin, and comparing, like Robert Hooke's *Micrographia*, the perfection of a bee's stinger with the uneven surface of a manufactured needle. The difference between the *Spectacle* and the *Histoire naturelle* highlighted two different ways to begin an account of natural history. Buffon started with "*les choses en grand*," whereas Pluche, in the spirit of traditional natural theology, gave priority to the wonders of the microworld. And, in fact, if Pluche fit perfectly well within the contemporary theological framework, Buffon's starting point would often be declared atheistic and materialistic. Indeed, the engraving depicting God at the beginning of Buffon's *Natural History* was considered to be a hypocritical gesture intended to fool the Sorbonne's theologians. (See Figure 2.)⁹

Buffon drew quite deliberately on his Roman predecessor. The first words of the *Histoire naturelle* were not his, but Pliny's: "*Res ardua vetustis novitatem dare, novis auctoritatem, obsoletis nitorem, obscuris lucem, fastiditis gratiam, dubiis fidem; omnibus verò naturam, & naturae suae omnia* [A difficult enterprise it is therefore to make old things new, to give authority and credit to novelties, to polish and smooth that which is worn and out of use, to set a gloss and luster upon that which is dim and dark, to grace and countenance things disdained, to procure belief to matters doubtful, and in one word, to reduce nature to all, and all to their own nature]." The fact that a modern naturalist began his book with a reference to a Roman writer might be regarded as merely a standard declaration of allegiance to the ancients. But this reference can also be read with a more critical eye, for the same quotation occurred in the opening of another contemporary book, André-François Boureau-Deslandes's *Histoire critique de la philosophie*.¹⁰ Strikingly, both projects drew on the very same text: the new history of philosophy and the new natural history both stood under Pliny's protection. In using this quotation, both writers

Historie of the World and into French as *Histoire du monde*. See Caius Plinius Secundus, *L'Histoire du monde de Pline Second, le tout mis en français par Antoine du Pinet*, 2 vols. (Lyon: Cl. Senneton, 1566); and Pliny, *The Historie of the World Commonly Called the Naturall Historie of C. Plinius Secundus, Translated into English by Philemon Holland, Doctor in Physicks*, 2 vols. (London: Adam Islip, 1601). Claude Duret, *Histoire admirable des plantes* (Paris: Nicolas Buon, 1605), p. v, referred in his preface to Pliny's "*Histoire universelle*."

⁸ Noël-Antoine Pluche, *Le spectacle de la nature, ou Entretiens sur les particularités de l'Histoire naturelle, qui ont paru les plus propres à rendre les jeunes gens curieux, et à leur former l'esprit*, 9 vols. (Paris: Veuve Estienne et Jean Desaint, 1732–1750). Pluche's *Spectacle* ranks fourth in Daniel Mornet's survey of private library catalogues (it was present in 206 libraries), behind Pierre Bayle's *Dictionnaire historique et critique* (288 occurrences), Clément Marot's *Oeuvres* (252), and Buffon's *Histoire naturelle* (220). See Daniel Mornet, "Les enseignements des bibliothèques privées (1750–1780)," *Revue d'Histoire Littéraire de la France*, 1910, 17:449–496, on p. 460.

⁹ See Lelarge de Lignac, *Lettres à un Américain sur l'Histoire naturelle* (cit. n. 5), first letter, Vol. 1, pp. 94–95; and Thierry Hoquet, *Buffon illustré: Les gravures de l'Histoire naturelle (1749–1767)* (Paris: Éditions du Muséum National d'Histoire Naturelle, Collection Archives, 2007), pp. 155–159.

¹⁰ See Pliny, *Historie of the World* (cit. n. 7), "The Preface or Epistle Dedicatorie to Prince Vespasian," n.p.; and André-François Boureau-Deslandes, *Histoire critique de la philosophie, où l'on traite de son origine, de ses progrès, et des diverses révolutions qui lui sont arrivées jusqu'à notre temps*, 4 vols. (Amsterdam: F. Changuion, 1737–1756), Vol. 1, pp. vi–vii.



Figure 2. Buffon: God creating the world? © Buffon, *Histoire naturelle générale et particulière* (Paris: Imprimerie Royale, 1749), Volume 1. In 1751, Lelarge de Lignac's *Lettres à un Américain* attacked Buffon's "bonne physique" for telling the story of the creation of the universe without referring to the Creator. According to Lignac, there is a discrepancy between Buffon's text and the plate situated at the beginning of "The Formation of the Planets"—a drawing by Nicholas Blakey (?–1758), an Irishman living in Paris, engraved by Fessard.

meant to alert their readers to the fact that they were trying to present new content in old trappings. Both were aiming to provide a new philosophy.

The problem facing Buffon was that natural history, confined to the mere collection of data, lacked ambition. Notwithstanding the book's title, the avowed goal of Buffon's *Histoire naturelle* was to present a real natural philosophy; he simply refused "to limit its ambitions merely to exact descriptions." In fact, according to Buffon, natural history must try "to raise itself to something greater" and, more particularly, "to open roads in order to perfect the various parts of physique."¹¹ Buffon's conception of natural history therefore considered the gathering of facts to be only a preliminary step toward attaining a higher

¹¹ Buffon, "Premier discours: De la manière d'étudier et de traiter l'histoire naturelle," in *Histoire naturelle*, Vol. 1 (1749), pp. 50–51.

level of generality. His work was really an attempt to produce the true physique—or at least to provide his successors with the certain means to achieve it.

This objective of establishing a true philosophical physique could be derived from the tension at play between the philosophical and the historical. Buffon praised Aristotle and Pliny for their philosophical spirits. In Aristotle, Buffon acknowledged “a certain twist in the ideas, that [he] would willingly call his philosophical character,” and in Pliny, “a certain freedom of mind, a boldness in thinking which is the seed of philosophy.” Therefore, the two masters of ancient science were both credited as creators or anticipators of a philosophical kind of project. Buffon bewailed the fact that, among his contemporaries, “philosophy is neglected.”¹² However, if this was the case, and if Buffon wanted to set natural history on a higher level, closer to what was commonly understood as natural philosophy, why did he not entitle his work *Natural Philosophy* instead of the old-fashioned (and indeed thoroughly abused) *Natural History*?

In fact, Buffon’s *Histoire naturelle* was an attempt to redefine the term “history.” Throughout the monographs devoted to various animals, Buffon attacked earlier uses of the word, deploring, for instance, that this part of science had never been carefully studied before: “the works, the older as well as the newer ones, bearing the title of *History of the Birds* contain almost nothing historical.”¹³ In this context, the goal of history was very clear: it should tell us what the species actually *do*. History was thus the “moral” part of science, having to do with *mores* (*moeurs*, habits). The problem of birds’ interbreeding was *historical* insofar as it explained who mated with whom. It was a behavioral question, just like many others: we have “to figure out what our swallows do while in Africa and our quails while in Barbaria” or “get some information on the habits of the birds in China or in the Monomotapa.”¹⁴ *Description* attended to the animal’s anatomical dimensions, detailing the measurements of the body’s various parts; but the proper concern of *history* had to do with the “moral” aspects of the life of a species—namely, its habits.

This was therefore a first important reason why Buffon chose to call his book a “natural history.” When Buffon was urging his contemporaries to write the natural history of birds, he was in fact exhorting them to observe animals and collect facts about their ways of living. Thus “facts will multiply, our knowledge will grow and our historical attempt, of which we could sketch only the first lines, will more and more be filled and will gain in solidity [*prendra plus de corps*].”¹⁵ In Buffon’s *Histoire naturelle*, history was a method (induction from facts to laws) and a field for new inquiries (regarding ethological or behavioral matters).

PHYSIQUE WITHOUT MATHEMATICS, BUFFON WITHOUT NEWTON

In Buffon’s time, natural history was as much a division of knowledge as a specific method for studying nature. It was a science dealing with *naturalia* that used specific procedures such as the collection of data. As a division of philosophy, natural history could be identified with the true physique—a point that Buffon’s *Histoire naturelle* made particularly clear. Because his aim was “to perfect different parts of physique,” he

¹² *Ibid.*, pp. 48, 52.

¹³ Buffon, “Plan de l’ouvrage,” in *Histoire naturelle*, Vol. 16 (1770), pp. v, xxiii (emphasis added).

¹⁴ *Ibid.*, p. xxiv. Addressing the first question had an anti-Linnaean impact because Linnaeus had written (following others, like Olaus Magnus) that swallows hid in the swamps during the winter. See Philippe Guéneau de Montbeillard, “Les hirondelles,” in *Histoire naturelle*, Vol. 21 (1779), pp. 558–559.

¹⁵ Buffon, “Plan de l’ouvrage,” p. xxiv.

constantly turned to physical causes or reasons. He also criticized several authors (such as Johann Jakob Scheuchzer and John Woodward) for confusing physique with theology or metaphysics.¹⁶

The physique he had in mind, Buffon argued, would not take a mathematical shape. According to the “Premier discours,” mathematical demonstrations had their own ways of proving propositions or reaching truth. If this knowledge was susceptible to being applied to some restricted fields in physique, it still did not imply a universal model to which all scientific discourse had to conform. This position could be considered a type of Epicurean or Aristotelian critique of mathematics. After all, Buffon considered mathematics to be constructed through abstraction (i.e., separation), turning material objects into mere “objects of thoughts.” This implied a distinction between two different kinds of truths: mathematical truths, albeit self-evident, were only in our minds; whereas physical truths, while only “probable” or “certain,” were nonetheless the guarantors of a “real” science. By way of example, he explained that the mathematician demonstrated with complete “obviousness (*évidence*),” whereas the *physicien* gathered facts, and on that factual basis he built hypothetical truths that would reach a degree of infinite probability that Buffon called “certitude.” According to Buffon—here following the Dutch physicist Willem Jacob s’Gravesande (1688–1742)—what mathematics gained in *évidence*, it lost in *réalité*. Mathematical and physical truths belonged to two different fields. Mathematics was a science of definition, moving in a conceptual environment full of idealizations. In contrast, physical truth did not need to be demonstrated by means of axioms and chains of propositions.¹⁷

Mathematical truths were nothing but “*des vérités de définitions*,” simple but abstract combinations of ideas, repeating the content of the definition in different words, whereas physical truths rested on the secure basis of facts. Mathematical truths were “*des identités d’idées*,” without any claim to reality—mere suppositions logically deduced from the original hypothesis. Physical truths, in contrast, did not rely on human deduction; they depended on the repetition of the same events. Their essence consisted of an “uninterrupted succession of the same events.” “In mathematics, one supposes; in physique, one poses and establishes; there, there are definitions; here, there are facts; one goes from definition to definition in the abstract sciences; one proceeds from observation to observation in the real sciences. In the first case one arrives at *évidence*, whereas we reach *certitude* in the latter. The word ‘truth’ includes those two meanings.”¹⁸

If we are to understand the meaning of “physique” in the Buffonian context, we have to return to the structure of French institutions and, most conspicuously, to the division of the Académie Royale des Sciences into two different classes: mathematics and physique. Christiaan Huygens first instituted this division at the end of the seventeenth century in the Académie’s original statutes, and it lasted until the marquis de Condorcet’s reform in 1785.¹⁹ Huygens recommended that the two classes meet on different days (Wednesday

¹⁶ See Buffon, “Premier discours,” in *Histoire naturelle*, Vol. 1, pp. 50–51; and Buffon, “Article V: Exposition de quelques autres systems,” *ibid.*, p. 197. The general index in Vol. 15 (1765) reveals Buffon’s insistence on physique throughout the *Histoire naturelle*.

¹⁷ See Willem Jacob s’Gravesande, *Discours sur l’évidence* (1724), in *Éléments de physique démontrés mathématiquement et confirmés par des expériences*, trans. Élie de Joncourt, 2 vols. (Leyden: Langerak & Verbeek, 1746). A statement like “Pierre vit aujourd’hui” provided certain, albeit unnecessary, knowledge (its contrary was possible). On s’Gravesande’s possible impact on Buffon see Thierry Hoquet, *Buffon: Histoire naturelle et philosophie* (Paris: Champion, 2005), pp. 299–306.

¹⁸ Buffon, “Premier discours,” in *Histoire naturelle*, Vol. 1, p. 54.

¹⁹ See Christiaan Huygens, *Oeuvres complètes*, Vol. 19 (1937), rpt. ed. (Amsterdam: Swets & Zeitlinger,

and Saturday, respectively). If this strict division faded away over time, historians of the Académie have emphasized that there nonetheless remained a rather nonporous boundary between the mathematical and the physical sections, one that very few scientists crossed.²⁰

Taking this division into account helps in clarifying that, in Buffon's time, pursuing the true physical system did not mean working in a mathematical manner. Buffon's *Histoire naturelle* was a kind of nonmathematical treatise of physique. In the context of the Parisian institutions of science, it served to harden the difference between the two classes of the Académie des Sciences somewhat. At least, it strongly emphasized that the distinction between the *classes mathématiques* and *classes physiques* was not just an arbitrary matter.

This interpretation—that Buffon's *Histoire naturelle* was an attempt to set the foundation for a nonmathematical physique—seems to contradict the historiographical image of the young Buffon enthusiastically embracing a Newtonian conception of science in the vanguard of the Parisian scientific scene. Buffon's reputation as one among the anglophile avant-garde of scientists who contributed to the introduction of English ideas in France, and more particularly as one of France's most distinguished Newtonians, is so entrenched that his opposition to a mathematical physique (as well as his claims against final causes) is read as a rhetorical stance or as a contradiction within his system.²¹ Before I develop an argument for a nonmathematical physique, Buffon's relationship with Newton as it emerges in the *Histoire naturelle* must be clarified.

Buffon did start his scientific career as a Newtonian. He agreed that science should search for nature's laws and that those laws should be as simple and as universal as possible. Buffon's strong stance in favor of an orthodox Newtonianism was most obvious during his academic polemics with Alexis Clairaut. Buffon also published translations of two English books: Stephen Hales's *Vegetable Staticks* (1735) and Newton's *Treatise on Fluxions* (1740). The young man who wrote the prefaces to these books praised the experimental spirit of the English. But to what extent did these texts in fact express Buffon's supposed Newtonian position?

In the preface to *La statique des végétaux*, Buffon's references to Hales himself were oblique at best. He simply stated that the time he had devoted to the translation sufficiently demonstrated his interest in the work; he did not need to "expand on the merits of this book." (See Figure 3.) The public, Buffon suggested, would distrust the praise of a book offered by the translator—certainly a very offhand way of paying tribute to the author. In contrast, Buffon was perfectly willing to highlight the faults he found in *Vegetable Staticks*, especially the lack of explicit connections between the facts it put forward. As for Newton, the praise he received in this preface to Hales's work amounted to nothing more than a rather general statement: he was credited for a critique of barren systems and a complete devotion to observation. The role of mathematics in Newton's reform of natural

1967), p. 268, point 4, in which the program for the "Assemblée de physique" was described: "Its main and most useful occupation will be, in my view, to work on natural history more or less according to Verulamius's design. This history consists in experiments and remarks and is the only way to reach knowledge of the causes." See also *Histoire de l'Académie Royale des Sciences*, year 1699 (published 1702), preface. This organization of the Académie lasted until 1785, after which it was divided into eight different classes (géométrie, astronomie, mécanique, physique générale, anatomie, "chimie et métallurgie," "botanique et agriculture," "histoire naturelle et minéralogie").

²⁰ Whereas there were numerous cases of promotion between the various classes of each part of the divisions (for instance, from *mécanicien* to *géomètre*), only three scientists were promoted from a *classe de mathématiques* to a *classe de physique* or vice versa: Buffon, Jean-Nicolas de La Hire, and La Condamine.

²¹ Jeff Loveland, *Rhetoric and Natural History: Buffon in Polemical and Literary Context* (Oxford: Voltaire Foundation, 2001).

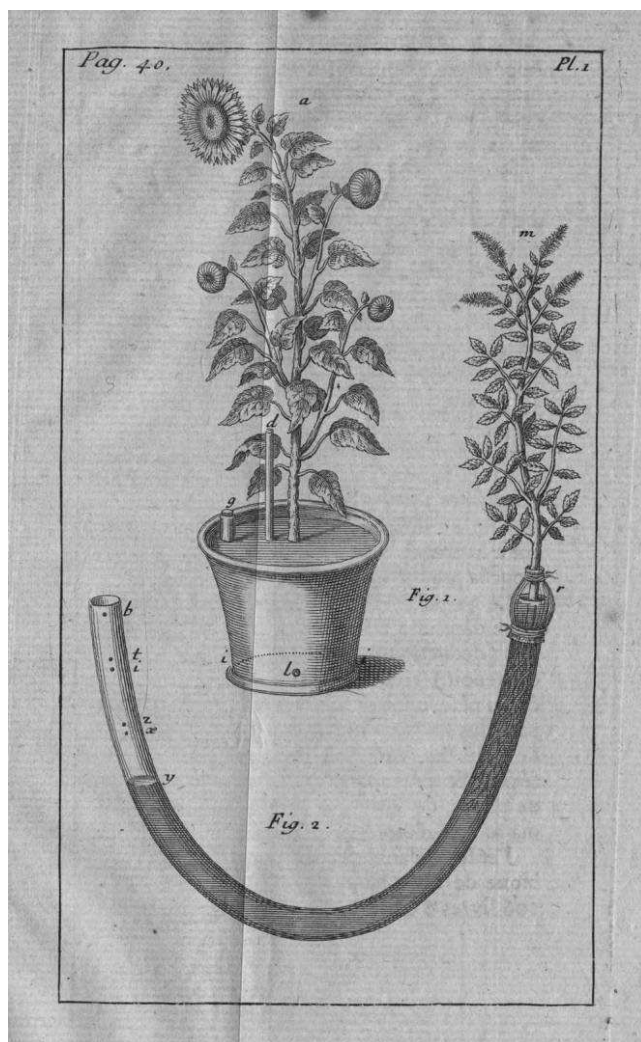


Figure 3. Page from Buffon's translation of *Vegetable Statics*. S. Hales, *La statique des végétaux, et celle des animaux* (Paris: De l'Imprimerie de Monsieur, 1779). © MPIWG, Berlin. Buffon's 1735 translation of Hales's *Vegetable Statics* is his declaration of allegiance to the true experimental spirit. Nevertheless, his praise loosely groups Newton together with "Verulam, Galileo, Boyle, Stahl" and "these gentlemen of the Académie des sciences de Paris." Simultaneously, Buffon refuses to "expand on the merits of this book"—a very offhand way of paying tribute to the author.

philosophy and the lawlike form he gave to his physical principles were not even mentioned. Buffon clearly praised the experimental spirit in contrast to the *esprit de système*. Hales's book, he asserted, "belongs to an excellent genre, since it is nothing but experiment [*expériences*] and observation." If experiment was of such importance, it was because, "with regard to physique, experiments must be sought as much as systems must be feared." The idea of a unique principle that would rule the universe was explicitly given as an example of what physique should avoid as "vain and fanciful." And, as Buffon clearly stated:

It is not enough, in order to be a *Physicist*, to know what would happen according to this or that hypothesis, one postulating, for instance, a subtle matter, vortices, an attraction, etc. It is a question of being well aware of what does happen, and of knowing well what takes place under our eyes: the knowledge of the effects will lead us insensibly to that of the causes, and one shall no longer fall into the absurdities which seem to characterize all systems.²²

Oddly enough, attraction was included, together with Cartesian vortices, among the misleading hypotheses. If Buffon nonetheless praised the method of “the Great Newton,” it was only under the guise of plain Baconian natural history: “the gathering of heaps of facts and the avoidance, as much as possible, of any *esprit de système*, at least until we are instructed.” If Newton was offered as a methodological model, it was neither for his use of mathematical reasoning nor for his discovery of the law of attraction but, rather flatly, for his *hypotheses non fingo*. Newton was therefore joined in Buffon’s praise by “Messieurs de Verulam, Galilée, Boyle, Stahl,” together with the members of the Parisian Académie des Sciences and, especially, “messieurs Huygens, de Réaumur, Boerhave, etc.” Buffon was far from claiming a complete devotion to Newton’s natural philosophy or from hailing attraction as the key to physique. The idea of a young Buffon first among the Newtonians lacks textual support in his edition of *La statique des végétaux*.²³

The case of the preface to Newton’s *Fluxions* (1740) was a different matter, since it appeared to be a sign of allegiance both to Newton and to mathematics (in the guise of the calculus).²⁴ But in fact Buffon’s preface, while acknowledging the perfect clarity of Newton’s ideas, developed a metaphysical critique of the concept of the infinite that had been closely tied to the practice of geometry. Buffon asserted that our daily experience (by means of sensation) is restricted to the limited, the finite—and therefore that the arithmetical or geometrical infinite had no actual existence. The preface to the *Fluxions*, far from being a sign of Buffon’s loyalty to mathematical conceptions of science, instead stressed the lack of reality of mathematical ideas. Some of these strong statements would later be developed near the end of the “Premier discours” of the *Histoire naturelle*.

Buffon’s quarrel with Clairaut over the status of laws in physique illustrated his true thoughts about Newton. The quarrel encompassed arguments taken from both physique and metaphysics. If a natural law in physique was confronted with an exception, Buffon asked, did the law have to be modified in order to cover that particular case? Clairaut thought that a new term in $1/R^4$ should be added to the traditional form of the law in $1/R^2$. Buffon, in contrast, believed that the law should retain its universal form and that interfering factors should be sought to explain the apparent exception. For Buffon, every time the form of a simple law was modified, new forces were in fact added and, implicitly, were presumed to act. That was why, in the case of astronomical movements, he refused to modify the law of attraction, in order to avoid the multiplication of “occult principles.” Nevertheless, Buffon did resort to the possibility of devising new forces in his studies of the mystery of generation and the reproduction of organic beings.

²² Stephen Hales, *La statique des végétaux et l’analyse de l’air*, trans. Georges-Louis Leclerc, comte de Buffon (Paris: Debure l’Aîné, 1735), pp. viii–ix. Phillip Sloan’s translation of this text “Newtonizes” Buffon’s sentences, because he uses “natural philosophy” for the French word “*physique*” and “natural philosopher” for “*physicien*.” Such translations wrongly emphasize an identity between the two terms, hinting thereby at a close identification of Buffon with Newton that is otherwise unsupported by the text. See John Lyon and Phillip R. Sloan, eds., *From Natural History to the History of Nature: Readings from Buffon and His Critics* (Notre Dame, Ind.: Univ. Notre Dame Press, 1981), p. 38.

²³ Hales, *Le statique des végétaux*, trans. Buffon, p. vi.

²⁴ Isaac Newton, *La méthode des fluxions et des suites infinies*, trans. Georges-Louis Leclerc, comte de Buffon (Paris: De Bure, 1740).

Buffon's support of an overall Newtonian cosmography did not imply that he was thoroughly Newtonian, particularly when he discussed organic beings. In his theory of generation, the concept of *forces pénétrantes* was often mixed up with attraction. The *forces pénétrantes* and attraction had common features. Most conspicuously, those forces were not susceptible to perception by the human eye, since they acted on matter three-dimensionally, whereas human vision only perceives surfaces (bi-dimensional planes). Yet *forces pénétrantes* were not attractions. In point of fact, Buffon revised Newton's place in the history of mechanics. The key question here is the number of forces operating in nature: the Aristotelians multiplied forces to excess, whereas the Cartesians restricted them, with equal vigor, to mere impulsion (forces acting by contact). Newton, however, enlarged this tight mechanical Cartesian framework and demonstrated that natural forces other than impulsion could be taken into consideration. This is what Newton means in the Buffonian history of physique: he is regarded as setting a precedent, as the person who showed that there was a middle ground between the symmetrical excesses of the Aristotelians' occult qualities and the Cartesians' narrow mechanics. This does not prove that Buffon was a Newtonian. In fact, Buffon belongs instead with naturalists of a third type, which Roger Côtés described in the preface to Newton's *Principia mathematica* as "those who admit in philosophy no other rule than experience itself."²⁵ While both Buffon and Newton belonged in this category, it did not make a Newtonian of Buffon. As was commonly noted in the eighteenth century, only sects that were in error kept their leader's name: truth did not bear the name of any individual. A true physicist, as Buffon asserted he was, followed only one master: *l'expérience*.

HISTORY WITHOUT TIME

Buffon's natural history was a not a mathematical physique, but a historical one. Here we encounter an important set of traditional claims in the Buffon historiography: namely, that it is he who introduced time into nature. The temporal interpretation of history may very well have merit, and his association with it may account for much of Buffon's reputation in the early nineteenth century, particularly among figures such as Johann Gottfried Herder who were trying to think historically. But this status as a forerunner of historicism, analogous to Buffon's reputation as a forerunner of evolutionary thinking, should not lead us to overlook other interpretations of the concept of history, such as nontemporal epistemological conceptions.

Buffon himself attributed an important role to time, calling it "the great worker in nature [*le grand ouvrier de la nature*]."²⁶ It could be argued that the very title of his masterwork testified to the achievement of introducing time into nature. His contribution to the epistemic transition from a natural history (understood as a mere description) to an authentic history of nature (*histoire de la nature*), understood in a temporal fashion, can even be documented.²⁷ Time did play an important role in Buffon's work, and it bore various meanings: from the cyclical concept we find in the 1749 texts to the more evolving

²⁵ Isaac Newton, *Principes mathématiques de la philosophie naturelle*, trans. Mme. du Châtelet (Paris: Desaint-Sallant-Lambert, 1759), Vol. 1, p. xxii (quoting Roger Côtés).

²⁶ Buffon, "Les animaux sauvages," in *Histoire naturelle*, Vol. 6 (1756), p. 60.

²⁷ Note the titles of Lyon and Sloan, eds., *From Natural History to the History of Nature* (cit. n. 22); Jacques Roger, "Buffon et l'introduction de l'histoire dans l'histoire naturelle," in *Buffon 88: Actes du colloque pour le bicentenaire de la mort de Buffon*, ed. Jean Gayon (Paris/Lyon: Vrin-IIIIE, 1992), pp. 193–205; and Giovanna Bernardini, "Buffon, la storia della natura e la storia degli uomini," *Studi Settecenteschi*, 1986, 4:167–189.

time in those of 1778, which leaves a place for decay and collapse—a conception that is sometimes contrasted with Condorcet's emphasis on progress.²⁸ Buffon's methodology has even been characterized as introducing time everywhere—and especially in his concept of natural species, where his biting criticism of the Linnaean conception (species as a mere collection of resemblances) led him to a dynamic notion (species as lineages, producing fecund offspring).²⁹

Obviously, for a dynamic and temporal conception of nature to be achieved, a complete revolution had to occur in the meaning of the word "history [*histoire*]" and the expression "*histoire naturelle*," which would become the name of Buffon's scientific and editorial enterprise. According to Jacques Roger, addressing the question of time in nature implied an understanding of the word "history" itself.³⁰ If history was to be understood only as the science of temporal events (as Roger himself affirmed), then the "history" of nature amounted to no more than the question of the earth's age and the origin of life. This was also the opinion of June Goodfield and Stephen Toulmin, who attempted to show how a "remarkable feature"—time—was introduced into our framework of nature through the development of a history of nature.³¹ This narrative described quite efficiently the sense in which Buffon contributed to the development of biological theory.

But is there not another meaning of "history"? The temporal meaning of "history" derives mostly from a nineteenth-century conception, which is not of any help to those critics interested in understanding what was going on in Buffon's monumental work. Perhaps, as John Eddy has argued, Buffon had no sense of time at all and his *Histoire naturelle* was not a history but, instead, a nonhistorical or nondevelopmental system.³² It may be that, in Buffon's context, a work or a science did not need to be temporal to be called "history." In other words, history (at least in the eighteenth-century meaning of the term) did not require time, nor did time imply history. What we therefore have to understand is what history was or could have been if it were not "historical" or before it became so. We must recall that, during Buffon's era, when a book was called a "history" it did not rely on time but on other types of requirements—namely, methodological ones—that have been entirely overlooked in contemporary scholarship.

Eighteenth-century history must be conceptualized in several forms, among which natural history and civil history are but two examples. History did not deal only with *naturalia* or societies. The history of a country, published by European travelers, could be

²⁸ See Hans-Jörg Rheinberger, "Buffon: Zeit, Veränderung und Geschichte," *History and Philosophy of the Life Sciences*, 1990, 12:203–223; and Giovanna Bernardini, "La concezione del tempo nell'*Histoire naturelle* di Buffon," *Rendiconti dell'Istituto Lombardo (Classe di Lettere e Scienze Morali e Storiche)*, 1991, 125:201–213.

²⁹ See Phillip R. Sloan, "Buffon, German Biology, and the Historical Interpretation of Biological Species," *British Journal for the History of Science*, 1979, 12:109–153; Sloan, "From Logical Universals to Historical Individuals: Buffon's Idea of Biological Species," in *Histoire du concept d'espèce dans les sciences de la vie (Colloque international, Paris, 1985)* (Paris: Éditions de la Fondation Singer-Polignac, 1987), pp. 101–140; and Jean Gayon, "L'individualité de l'espèce: Une thèse transformiste?" in *Buffon* 88, ed. Gayon (cit. n. 27), pp. 475–489.

³⁰ Jacques Roger, *Pour une histoire des sciences à part entière* (Paris: Michel, 1995), p. 201. This position was a sharp criticism of Michel Foucault's *epistemes* (or orders of discourse). Foucault's *Les mots et les choses* [*The Order of Things*] implemented a pattern of discontinuity between various *epistemes*. If John Ray belonged to the classical time, Georges Cuvier belonged to a totally different cultural period, and no bridge could be constructed between those two *epistemes*. See Michel Foucault, *Les mots et les choses: Une archéologie des sciences humaines* (Paris: Gallimard, 1966).

³¹ Goodfield and Toulmin, *Discovery of Time* (cit. n. 3), p. 17.

³² See John H. Eddy, Jr., "Buffon's *Histoire Naturelle*: History? A Critique of Recent Interpretations," *Isis*, 1994, 85:644–661.

a natural history and, at the same time, a moral, ecclesiastical, or political history.³³ Such publications demonstrate that history was understood to be a general method, shared by different kinds of “historians,” regardless of whether they were studying the animal kingdom or the British empire. Apart from its temporal meaning, the word “history” had a special relevance in its methodological meaning of “inquiry” or “description.” History was a unique science. It was a method of description that could be applied to various fields or subjects, and the question of time had little or nothing to do with it.³⁴

Without taking for granted the supposedly necessary relationship between “natural history” and time, we might ask why Buffon wrote a book with “history” in the title if he did not intend to introduce time into the study of nature. There were, in the eighteenth century, at least two very definite and much discussed concepts of (natural) history. The first was the Baconian version, in which natural history worked together with natural philosophy. It had to do with the collection of well-established facts and was a preliminary step in the process of science. This was a very popular concept, as the many book titles that used the phrase—such as Robert Plot’s *Natural History of Oxfordshire* and Erich Pontoppidan’s *Natural History of Norway*—suggest.³⁵ More particularly, the concept of history as the collection of facts had a profound impact on eighteenth-century thought. It was evident in François Boissier de Sauvages’s 1772 treatise and, as late as 1787, in Immanuel Kant’s *Critique of Pure Reason*, where the “historical” was opposed to the “mathematical” or “rational.”³⁶

The second conception of history was appropriated from the civil historians, especially from scholars like Nicolas Fréret (1688–1749), a member of the Académie Royale des Inscriptions et des Belles Lettres. For them, history was the paragon of a nonmathematical science, which had to rid itself of the methodological requirements of mathematics—namely, step-by-step demonstrations proceeding from definitions. As seen from this perspective, history thus became the epistemological model of a nonmathematical science, where knowledge relied on another kind of truth: the gathering and careful examination of “monuments” or records.

Buffon’s *Natural History* actually drew from two different conceptions of history. The first was connected with the natural sciences and indicated a more or less nonsystematic collection of data. The other came from the civil historians and implied a nonmathematical way of acquiring certainty through the search for specific evidence. In both cases,

³³ See, e.g., José de Acosta, *De natura novi orbis* (1589), trans. in R. Regnault, *Histoire naturelle et morale des Indes tant orientales qu’occidentales* (Paris: Marc Orry, 1598); and Engelbert Kaempfer, *Histoire naturelle, civile et ecclésiastique de l’Empire du Japon*, 2 vols. (La Haye: P. Gosse & J. Neaulme, 1729).

³⁴ See Foucault, *Les mots et les choses* (cit. n. 30).

³⁵ See Robert Plot, *The Natural History of Oxfordshire, Being an Essay towards the Natural History of England* (1677), 2nd ed. (Oxford/London: Leon Lichfield, 1705); and Erich Pontoppidan, *The Natural History of Norway, Containing a Particular and Accurate Account of the Temperature of the Air, the Different Soils, Waters, Vegetables, Metals, Minerals, Stones, Beasts, Birds, and Fishes*, 2 vols. (London: A. Linde, 1755).

³⁶ According to Boissier de Sauvages, there were only three ways to acquire new knowledge: history, philosophy, and mathematics. “History is the knowledge of facts,” whereas mathematics was the knowledge of quantities and measures and philosophy the knowledge of causes and principles. See François Boissier de Sauvages, *Nosologie méthodique, ou distribution des maladies en classes, genres et espèces, suivant l’esprit de Sydenham et la méthode des botanistes*, trans. from Latin into French by M. Gouvion (Lyon: Jean-Marie Bruyset, 1772), §27. For Kant’s attitude see Immanuel Kant, “Die Architectonik der reinen Vernunft,” in *Kritik der reinen Vernunft, Zweite hin und wieder verbesserte Auflage* (Riga: Johann Friedrich Hartknoch, 1787). The translation by Norman Kemp Smith reads as follows (A836/B864): “all knowledge, subjectively regarded, is either historical or rational. Historical knowledge is *cognitio ex datis*; rational knowledge is *cognitio ex principiis*.” Kant, *Critique of Pure Reason*, trans. Norman Kemp Smith, rev. 2nd ed. (Basingstoke: Palgrave Macmillan, 2007), p. 655.

strikingly enough, history had nothing to do with time. Of course, civil historians did construct chronologies, but the real methodological questions historians dealt with had more to do with the concept of truth, the meaning of facts, or the authority of testimony. If Buffon related explicitly to this second conception, defining physique as an epistemological field distinct from mathematics, he appeared to dismiss the Baconian conception in his declaration that he was not aiming for the mere collection of facts. His (natural) history was a true philosophical physique. If history and philosophy of nature bore two different (and almost contradictory) meanings in the Baconian context, why call a book “history” when its contents were heavily “philosophical”? In other words, in what sense could Buffon’s work be said to be “historical”?

The polemical impact of Buffon’s stance was not lost on his contemporaries who were fighting the rise of heterodox Epicurean ideas in mid-eighteenth-century France. At times Buffon’s *Histoire naturelle* was read as an attack against both the mathematical and the theological physique.

HISTORY AND PHILOSOPHY IN THE BACONIAN CONTEXT: DESCRIPTION AND COLLECTION VERSUS ALCHEMY?

The Baconian interpretation of the natural scientist’s role urged historians to gather the fundamental pieces of information that would provide firm grounds for philosophy.³⁷ Even though Francis Bacon sharply criticized strict or pure empiricists, he maintained that it was not necessary that natural history respect any kind of order. Indeed, natural history could even be thought of as a mere “warehouse” of knowledge, the place where raw materials were collected or “compared,” waiting for the right time to become part of a construction that would be “physical” insofar as it dealt with nature (*physis*). In Bacon’s own words: “they who shall hereafter take it upon them to write natural history should bear this continually in mind—that they ought not to consult the pleasure of the reader, no nor even that utility which may be derived immediately from their narrations; but to seek out [*conquirere*] and gather [*comparare*] together such store and variety of things as may suffice for the formation of true axioms.” The reform of knowledge required a total recasting of the existing construction of science. In order to achieve that objective, Bacon divided the *Instauratio magna*, his general program for the new science, into six different sections.³⁸ Natural history occupied the third level and was said to be the real “foundation of philosophy.” Natural philosophy was the sixth and last part of science, the ultimate goal or science in action, but Bacon believed it to be out of reach, at least for the time being. Texts like the *Parasceve* and the *Sylva sylvarum* belonged to the level of natural history. The term “*Parasceve*” signified the act of making preparations, as on the eve of Shabbat; this text was aimed at creating a “natural and experimental history such as may serve for the foundation of a true philosophy.” Natural history must provide raw materials for the latter

³⁷ Francis Bacon, *Novum organum*, Bk. 1, Aphorism 117, in *Works*, ed. James Spedding, Robert Leslie Ellis, and Douglas Devon Heath (New York/Boston: Hurd & Houghton/Taggard & Thompson, 1861–1864).

³⁸ Francis Bacon, *Parasceve ad historiam naturalem et experimentalem*, “Aphorismi de conficienda historia prima,” Aphorism 2, in *Works*, ed. Spedding *et al.*, Vol. 2, p. 48, Vol. 8, p. 358. The six steps or divisions of the Baconian program were *Division of the Sciences*; *The New Organon or Directions Concerning the Interpretation of Nature*; *Phenomena of the Universe: Natural and Experimental History for the Foundation of Philosophy*; *The Ladder of the Intellect*; *Forerunners or Anticipation of the New Philosophy*; and *The New Philosophy, or Active Science*. For a careful study of the various styles adopted by Bacon for each of the different steps of the general scheme of science see James Stephens, *Francis Bacon and the Style of Science* (Chicago/London: Univ. Chicago Press, 1975), pp. 112 ff.

steps of science (and ultimately philosophy) in the same way that forests provided wood for the carpenter. This was also the reason why the ten “hundreds [*centuriae*]” of facts that constituted the first collection of data for natural history bore the title *Sylva sylvarum*. “*Sylva*” was the Latin equivalent of the Greek term “*hulè*,” the “first matter” on which one can operate and “inform.”³⁹ In the *Parasceve* and the *Sylva sylvarum* Bacon offered a pattern for historical knowledge: just gather the data, without claiming any sort of interpretation. History would therefore embody the epistemological idea of submission to phenomena; it would abandon any attempt to look for causes and stick to the act of gathering facts. Bacon concluded the *Parasceve* with a list of 130 histories that would have to be written (*Historia ventorum, Historia vitae et mortis* . . .) before the perfect and complete philosophy could hope to be realized. This meaning of natural history as raw material epitomized the very “method of Verulamius” for many philosophers.⁴⁰ On the one hand, it seemed that, even though Bacon himself did not consider history to be the ultimate form of science, it constituted a necessary requirement that paved the way to science, playing a preparatory or even a pedagogical role.

On the other hand, natural philosophy as the correct interpretation of facts was a distant prospect, which might be achieved only by large communities of researchers working together with data compiled in books (an *historia naturalis ex libris*).⁴¹ But in the true Baconian inductive sense, the “correct combination” of facts would automatically emerge from the collected mass once enough had—finally—been accumulated. Philosophy was therefore inherent to history.

This was precisely Buffon’s meaning. Though he owed much to the Baconian conception of history, bringing together civil history and natural history and trying to obtain some solid facts by way of comparison, Buffon did not restrict natural history to the narrow Baconian view.⁴² Instead, he broadened it to the philosophical theory of nature. He confronted the Baconian pattern insofar as he pretended that he would be able to reach philosophy. In the preface to his translation of Hales’s *Vegetable Staticks* Buffon praised Bacon, among others, in reference to the true method of natural history. He urged naturalists “always to gather experiments and to step away, if possible, from any spirit of system, at least until we are learned enough: someday we will surely find a way to order

³⁹ Bacon, *Parasceve*, “Descriptio Historiae naturalis et experimentalis, qualis sufficiat et sit in ordine ad basin et fundamenta philosophiae verae,” in *Works*, ed. Spedding *et al.*, Vol. 2, p. 43, Vol. 8, p. 353. See Lisa Jardine, *Francis Bacon: Discovery and the Art of Discourse* (Cambridge: Cambridge Univ. Press, 1974), p. 135: “A natural history is an uncritical record of observations of natural phenomena, which corresponds to the store in the memory of primitive sense-perceptions. This means that the observations it contains are to be recorded without embellishment, without bias, and without supporting citations from classical sources, as concisely and perspicuously as possible.” See also Paolo Rossi, *Francesco Bacone: Dalla magia alla scienza* (Bari: Laterza, 1957), p. 51: “La *Sylva Sylvarum* (una grande foresta che doveva offrire il materiale alle costruzioni future).”

⁴⁰ Francis Bacon, “Catalogus historiarum particularium secundum capita,” in *Works*, ed. Spedding *et al.*, Vol. 2, pp. 61–69, Vol. 8, pp. 373–381. Regarding the “method of Verulamius” see, e.g., a letter from René Descartes to Marin Mersenne, dated 10 May 1632, asking for a book containing “the history of celestial phenomena according to the method of Verulam”: *Oeuvres de Descartes*, ed. Charles Adam and Paul Tannery (Paris: Cerf, 1913), Vol. 1, p. 251. This referred to what Bacon had described in the fifth chapter of his *Descriptio Globi Intellectualis*: *Works*, ed. Spedding *et al.*, Vol. 7, p. 294, Vol. 10, pp. 410–411.

⁴¹ Bacon himself had to acknowledge that he would probably not see the sixth part of the *Instauratio magna* completed during his lifespan. See Bacon, *Novum Organum*, Bk. 1, Aphorism 116, in *Works*, ed. Spedding *et al.*

⁴² On the importance of comparison see Buffon, “Animaux communs aux deux continents,” in *Histoire naturelle*, Vol. 9 (1761), pp. 127–128: “With regard to the utility of comparing animals, it is evident that . . . in examining the notices of foreign animals communicated by travelers, it will enable us to distinguish names and facts, and to refer each to its proper species; and lastly it will render the history which I am now composing less defective, and perhaps more conspicuous and complete.”

this material; but even though we are not fortunate enough to raise the complete building, this will certainly help us to ground it, and maybe to make more progress than we expected.” Buffon repeatedly attacked the restricted conception of history as description: “We should not imagine that, even today, in the study of natural history, one should limit oneself to the making of exact descriptions and the ascertaining of particular facts.”⁴³

Restricted historical aims may be an appropriate goal for a novice; but experienced naturalists would not confine themselves to the simple accumulation of facts in the way Bacon had suggested. Instead, as Buffon put it, the naturalist would be eager “to combine the observations and to generalize the facts to bind them together by the strength of analogies; he will struggle to achieve the high degree of knowledge where we can judge that particular effects are dependent on more general ones, where we can compare nature to itself in its great operations, and from where we can finally open new roads to perfect the different parts of physique.”⁴⁴

This outlook would have important consequences for the qualities required in a naturalist. Buffon’s conclusion clearly favored the importance of the general issues:

A vast memory, assiduity and attention suffice to arrive at the first end; but more is needed here: general views, a steady eye, and a way of reasoning informed by reflection much more than by study; and lastly, this quality of mind is needed, thanks to which we can grasp distant relationships, bringing them together, and making out of them a body of reasoned ideas, after having accurately assessed the likeness and weighed their probabilities.⁴⁵

Despite the praise given to observations, and whatever the importance of isolated facts, the most important part of science consisted in binding these facts together by means of analogy. This process alone allowed one to deduce a general effect from a particular one. Buffon invoked the naturalist’s mind itself as the means of transcending the Baconian herd’s hamstrung empiricism. “Comparison,” hence, had two different meanings. In the Baconian warehouse, it referred to the accumulation of observations. In Buffon’s *Natural History*, however, comparison was the thread that led the reader out of the maze of isolated data.

Buffon claimed that he understood Bacon better than the Baconians did, since he sought to construct a natural philosophy, the interpretation of nature that was the ultimate and avowed aim of Bacon’s *Instauratio*. If Bacon had often criticized alchemists, he nonetheless borrowed their terminology to describe his own program as “*illuminating* the understanding, *extracting* the axioms, [and] *producing* numerous useful works [of philosophy].” His criticism thus did not bear on their program itself (*separare et extrahere*) but, rather, on the hastiness with which they tried to implement new (and weak or uncertain) results. Like Giambattista della Porta or Cardanus, who defined man as *naturae minister et interpres*, Bacon and his conception of natural history and philosophy were deeply indebted to the rhetoric of natural magic.⁴⁶

This may explain why Buffon’s book was not entitled *Natural Philosophy*. During

⁴³ George-Louis Leclerc, comte de Buffon, *Preface to Vegetable Statics*, in *Oeuvres philosophiques*, ed. Piveteau and Fréchet (cit. n. 6), p. 6; and Buffon, “Premier discours,” in *Histoire naturelle*, Vol. 1, p. 50.

⁴⁴ Buffon, “Premier discours,” in *Histoire naturelle*, Vol. 1, p. 50.

⁴⁵ *Ibid.*, p. 51.

⁴⁶ Bacon, *Novum Organum*, Bk. 1, Aphorism 130, in *Works*, ed. Spedding *et al.* (cit. n. 37). On Bacon’s relationship to alchemy see Rossi, *Francesco Bacone* (cit. n. 39), Ch. 1: “Le arti meccaniche, la magia, la scienza”; and Didier Deleule, “Francis Bacon, alchimiste de l’esprit humain,” *Études Philosophiques*, 1985, pp. 289–301.

Bacon's era the concept of natural philosophy was so tightly intertwined with the concept of alchemy that it risked coming off as ridiculous: the very concept conjured up quests such as that for the *Lapis Philosophorum* (philosopher's stone). The alchemical resonance of natural philosophy, an ancient tradition, survived in the eighteenth century as well. In Johann Ludwig Hannemann's 1718 *Synopsis philosophiae naturalis*, the natural philosopher was less a man dedicated to observation than an experimenter in search of the Great Work.⁴⁷ Newton's natural philosophy itself probably owed much to his interest in alchemy. Even though Newton, in his attempt to reduce "natural philosophy" to its "mathematical principles," transformed the meaning of the term, Buffon, who was rejecting the mathematical conception of physique, had many other reasons to avoid a title that resembled or evoked alchemical work.

Moreover, Buffon explicitly referred to this alchemical conception. He held that the idea of "method" (a complete system of classification) had been the "philosopher's stone" sought by naturalists. And today, he argued, they must drop the idea of a "philosophy" in the alchemical sense maintained by Bacon, for no general method could ever be achieved. Such a claim discredited the alchemical project.⁴⁸ The ultimate goal that Bacon had assigned to natural history (achieving the goal of philosophy) was now considered to be a pure fancy; it played a merely utopian function. What really mattered was to gather facts and put them to use as quickly as possible, for that represented the best chance of finding the right combination. According to Buffon, the quest for the philosopher's stone led to only one important result: though they would not find what they were seeking, in the course of their research naturalists would chance upon many other unexpected facts.⁴⁹ If "natural philosophy" had negative connotations (pertaining to alchemy), "natural history" was a much more neutral term. It enjoyed the good reputation of Baconian and Plinian solidity and was therefore susceptible to fruitful reinterpretations.

As a new physique that dismissed the Baconian pattern of merely accumulating natural historical facts, Buffon's *histoire naturelle* claimed to be knowledge of the general features of natural things. As a philosophy, it sought a nonmathematical way, leading from the scattered atoms of singular facts to the philosopher's stone of general laws. Restricting the domain of mathematics to a handful of abstract objects (like the orbits of the planets or the rays of light), Buffon aimed for a new type of physique, one that was very close to the spirit of the Cartesian philosophy but nonetheless challenged it. Just as Descartes referred to his *Discours de la méthode* as an introduction to "Geometry, Dioptricks, and Meteors," Buffon invited his reader to a careful investigation of the three specific "essays" of his new method: the theory of the Earth, the formation of the planets, and the generation of animals. Clearly Buffon was acting as the new Descartes of 1749, setting physique on a new foundation that was historical rather than mathematical.⁵⁰

⁴⁷ See Denis Zacaire, *Opusculé tres-excellent, de la vraye philosophie naturelle des metaulx* (Lyon: Benoist Rigaud, 1574); and Johann Ludwig Hannemann, *Synopsis philosophiae naturalis sanctioris illustrata* (Tübingen: G. Cotta, 1718). The *Journal des Savants* (1720) published a very severe review of Hannemann's book.

⁴⁸ Buffon, "Premier discours," in *Histoire naturelle*, Vol. 1, p. 13: "one sees clearly that it is impossible to establish one general system, one perfect method, not only for the whole of natural history, but even for one of its branches; for, in order to make a system, an arrangement, in a word, a general method, it is necessary that it includes everything."

⁴⁹ *Ibid.*, p. 14.

⁵⁰ See Hoquet, *Buffon* (cit. n. 17), pp. 179–184, 345–348.

HISTORY IN THE TREE OF KNOWLEDGE

In the *Système figuré des connaissances humaines*, the *Encyclopédie* of Denis Diderot and Jean d'Alembert depicted the tree of the sciences by relating different kinds of knowledge to diverse faculties of the mind, rather than relating each science to its objects. Three main scientific branches followed the three principal faculties: reason, memory, and imagination. All types of history—natural and civil, along with sacred and literary—grew out of the same branch and therefore shared a common method, resting on memory. History was the science in which factual records prevailed. Natural history thus involved working with memory, and so it was disconnected from physique, which constituted the last part of the sciences of reason. According to this model, physique was closer to mathematics, on which it in part depended, whereas natural history was condemned to be the blind accumulation of data, not even close to being a real science.

Buffon endorsed the conception of natural history as a collection of facts in order to build the philosophy of nature, but, unlike the Encyclopedists, he strongly opposed the mathematical conception of physique. The fact that natural history had no mathematical foundation did not constitute valid grounds for debasing it as an illegitimate science. Implicitly, in Buffon's view, "history" might be the name of another form of science, independent from mathematical norms. As a collection of data, history could, in fact, be the first step to the general knowledge of physical beings. Traditionally, if a science did not adopt the mathematical method it was scorned in its aspiration to be a science. D'Alembert and Diderot thus refused to grant natural history legitimacy as the complete science of natural beings, yet they included mathematics as a full-fledged member of the natural sciences. Clearly, if every science had to be mathematical in order to fulfill the true sense of the word, and if natural history amounted only to the collection of facts or, at best, their description, then natural history was not entitled to be called a science.

Buffon confronted this contention in two different ways. On the one hand, he unbound natural history from the mere collection of facts and tied it to physique. No longer a forerunner to science (as it had been in the Baconian framework), natural history was a science itself. On the other hand, Buffon debunked the pretension of mathematics to be the right method for physical science. Rather than the organon of science, he judged mathematics to be the most abstract and unreal science. What mathematics dealt with was nothing more than our fantasies or our own ideas. Therefore, according to Buffon, mathematical physics was no longer the science *par excellence*. It was the paragon of a discourse that had lost any sense of reality. In contrast, natural history, being a "*science réelle*," was "the source of the other physical sciences and the mother of all the arts."⁵¹ It was characterized in a strong parallel with civil history. Both were grounded on facts, and together they constituted the complete body of sciences.⁵² If natural history was the core science for philosophers, civil history was more helpful to statesmen. History collected and ordered facts that could not be invented by the human mind. Facts were to the historical sciences what experience was to everyday life.⁵³ They showed that knowledge

⁵¹ Buffon, "Premier discours," in *Histoire naturelle*, Vol. 1, pp. 58, 29.

⁵² *Ibid.*, p. 29: "The sciences might thus be divided into two main classes, which would contain all that is suitable for a man to know."

⁵³ *Ibid.*: "the sole true science is the knowledge of facts, the mind is unable to provide this, and facts are in the sciences what experience is in the civil life."

did not consist of Platonic ideas, Aristotelian forms, or Cartesian substances, but in “the *relations* that natural things bear to each other and to us.”⁵⁴

BUFFON BORROWS FROM THE HISTORIANS

Buffon reintroduced into natural history an epistemological conception of history, understood as a model for description, truth, and resemblances. History was a methodological framework, expressing the choice of a nonmathematical epistemology. It claimed that certainty and truth could be reached by collecting monuments and facts, rather than through the search for axioms, definitions, and demonstrations. History was a methodological guide for physique, better than mathematics. For a naturalist, the *more historico* was a method more useful than the *more geometrico*.

Buffon struggled against mathematical imperialism in ways that recall Nicolas Fréret’s demonstration that mathematics did not constitute a universal instrument. *La physique*, like *les belles lettres*, should find its own concepts and criteria for achieving science and discovering truth. The mere extension of the mathematical spirit to those fields would be a mistake and would most certainly lead to a complete epistemological failure.⁵⁵ History constituted a totally reliable and independent method, even if it reached truths that were impossible to demonstrate. That Cicero existed and that Caesar defeated Pompey at Pharsalus were *vérités de faits* as certain as any mathematical equation ($2+2=4$).

Drawing on the suggestions of historians, Buffon urged naturalists to distinguish between several kinds of truths and to make use of historical concepts. The full title of the “Premier discours,” “De la manière d’étudier et de traiter l’histoire naturelle,” was typical of historical and pedagogical treatises.⁵⁶ If “*manière*” was a word more or less equivalent to “*méthode*,” it was striking that it bore a very close relationship to the method of history. When Pierre Coste, working on his translation of John Locke’s *Essay on Human Understanding*, had to translate the expression “in this plain, historical method,” he selected “*d’une manière claire et historique*.”⁵⁷ Another one of Buffon’s titles, “Les époques de la nature,” drew on the historical concept of “*époques*,” most prominently used by Jacques Benigne Bossuet in his *Histoire universelle*. The epochs were defined as determinate

⁵⁴ *Ibid.*, p. 30.

⁵⁵ Nicolas Fréret, “Réflexions générales sur l’utilité des belles-lettres, et sur les inconvénients du goût exclusif qui paraît s’établir en faveur des mathématiques et de la physique,” *Mémoires de l’Académie Royale des Inscriptions et Belles-Lettres*, 1751, 16:11–37, esp. p. 24. Such a clear-cut distinction between the aims and methods of history and those of mathematics appeared already in Pierre Bayle’s *Dictionnaire historique et critique*; see Bayle, *Dictionnaire historique et critique*, 4th ed., 4 vols. (Amsterdam/Leyden: Samuel Luchtmans et al., 1730), “Dissertation qui fut imprimée . . . sous le titre de Projet d’un Dictionnaire critique à M. Du Rondel.”

⁵⁶ See, e.g., René de Lucinge, *De la manière de lire l’histoire* (1614), ed. M. J. Heath (Geneva: Droz, 1993); Charles Rollin, *De la manière d’enseigner et d’étudier les belles-lettres par rapport à l’esprit et au coeur: Traité des études* (1726–1728), translated into English as *The Method of Teaching and Studying the Belles Lettres; or, An Introduction to Languages, Poetry, Rhetoric, History, Moral Philosophy, Physics, &c.*, 3 vols. (London: Printed for W. Strahan, J. and F. Rivington, R. Baldwin et al., 1769); and Gabriel de Mably, *De la manière d’écrire l’histoire* (1783), in *Corpus des oeuvres de philosophie en langue française*, ed. B. de Negroni (Paris: Fayard, 1988). A manuscript by Charles-François Houbigant, Père de l’Oratoire, bore the title “De la manière d’étudier et d’enseigner les humanités” (1720). While this text remained unpublished, it was widely dispersed among scholars (Houbigant taught in the College de Juilly, where Montesquieu studied).

⁵⁷ John Locke, *Essai philosophique concernant l’entendement humain*, trans. Pierre Coste (1690; 5th ed., 1755), ed. É. Naert (Paris: Vrin, 1994), “Avant-propos,” §2. The conjunction of the words “method” and “historical” in the same sentence prompted Coste to use the French equivalent “*manière*,” whereas in the margin of §3 “method” was simply translated as “*méthode*” (“Méthode que l’on y observe”).

stances or points of view, from which the mind could encompass huge chapters of the history of mankind.⁵⁸

The most important concept Buffon transferred from civil to natural history was that of “monuments.” A monument was not just an architectural building but any kind of remains from the past that preserved a memory of events.⁵⁹ In a famous passage in his “Époques,” Buffon opened his reflections with reminders of several perplexing facts: the presence of “elephants” in the frigid North; the widely reported presence of seashells on the highest mountaintops. Buffon referred to both as “monuments,” objects indicating the earth’s former states.⁶⁰ He was not the first either to borrow the concept of monuments from civil historians or to make use of it in a naturalistic context. A very important category of natural monuments, the petrified seashells, had been termed “*reliquiae Diluvii*” (“remains of the Flood”) by several physico-theologians, like Scheuchzer and Bourguet.⁶¹ (See Figure 4.) Did this mean that Buffon bound the Book of Nature and the Holy Scriptures together? No; Buffon’s method or “way of comparison” excluded God from the natural sciences. He had translated a theological concept into a physical one. In Buffon’s theory, monuments had nothing to do with divine revelation. They were just a way of acquiring certainty through factual evidence. They provided historians with irrefutable knowledge, similar to the way demonstrations did in mathematics.

HISTORY, CIVIL AND NATURAL: CROSS-DETERMINATIONS OF THE TWO LEGISLATIONS

Buffon rethought the relationship between physique and mathematics, thereby challenging the classical *arbre des sciences*. The opposition to mathematics that he shared with civil historians explained why both types of history coalesced into a common methodology, referring to collections of “monuments.” Neither Fréret nor Buffon would have subscribed to Kant’s celebrated axiom, according to which “in every branch of natural science there is only as much science proper as there is mathematics therein.” But more than that, in binding natural history to civil history Buffon ignored another strong Kantian dichotomy: namely, that between man and nature. His “Epochs” opened with a very strong methodological statement:

As in civil history we consult deeds, seek for coins, or decipher antique inscriptions in order to determine the epochs of human revolutions and fix the date of moral events; so, in natural history, we must search the archives of the world, recover old monuments from the bowels of

⁵⁸ See Jacques Benigne Bossuet, *Discours sur l’histoire universelle à Monseigneur le Dauphin* (Paris: Sébastien Mabre-Cramoisy, 1681), in which each epoch was named after a man, allowing the historian to survey a definite period of time: e.g., “Adam, or the Creation,” and “Noe, or the Deluge.”

⁵⁹ See Bernard de Montfaucon, *L’antiquité expliquée et représentée en figures* (Paris: F. Delaulne et al., 1719); and Abbé Anselme, “Des monuments qui ont suppléé au défaut de l’écriture, et servi de mémoires aux premiers historiens,” *Mémoires de Littérature Tirés des Registres de l’Académie Royale des Inscriptions et Belles Lettres*, 1711–1717, 4:380–399, 1718–1725, 6:1–13.

⁶⁰ See, e.g., Buffon, “Second discours: Histoire et théorie de la terre,” in *Histoire naturelle*, Vol. 1, pp. 611–612: “It must however, be acknowledged, that . . . the shortage of historical monuments deprives us of the knowledge of facts.” See also Buffon, “Époques de la nature,” in *Histoire naturelle*, Vol. 34 (1778), p. 165: “When comparing those ancient monuments, from the first ages of living nature, with its actual productions . . .”

⁶¹ This tradition would be prolonged into the nineteenth century. See William Buckland, *Reliquiae diluvianae; or, Observations on the Organic Remains Contained in Caves, Fissures, and Diluvial Gravel and on Other Geological Phenomena Attesting the Action of an Universal Deluge*, 2nd ed. (London: J. Murray, 1824).

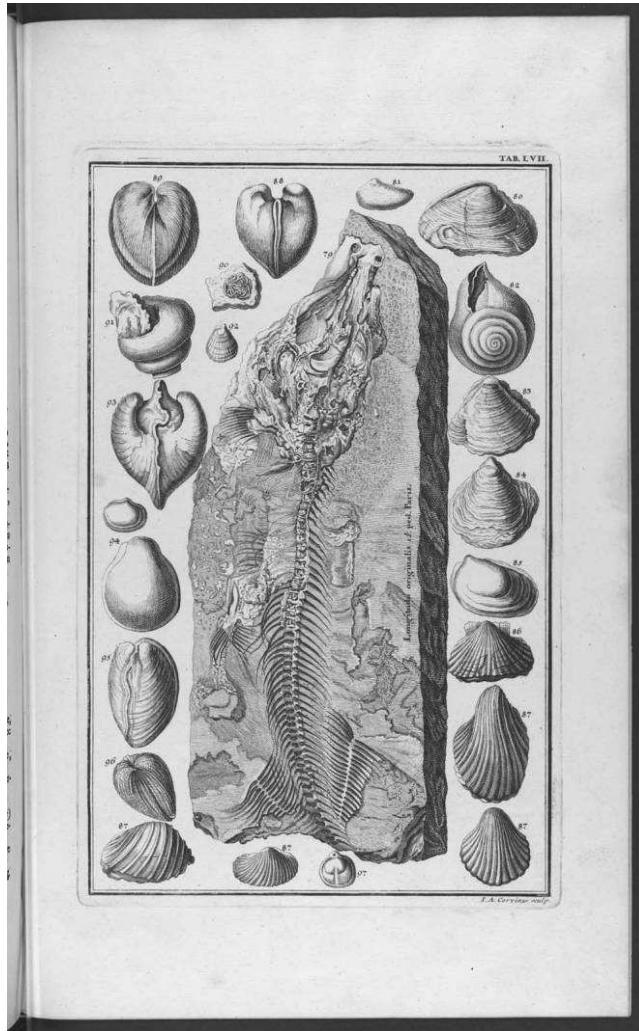


Figure 4. “Reliquiae Diluvianae.” Johann Jacob Scheuchzer, *Physique sacrée, ou Histoire naturelle de la Bible* (Amsterdam: Schenk, 1731–1737), Volume 1, Plate 57. © MPIWG, Berlin. In the tradition of natural theology, fish fossils and shells were thought to be “remains of the Flood.” In fact, many aspects of the natural world, such as the existence of mountains, were interpreted as “monuments” or evidence of the sacred history of nature.

the earth, collect their fragmentary remains, and gather into one body of evidence all the signs of physical change which may enable us to look back upon the different ages of nature.⁶²

Buffon unified nature and society through the concept of history, natural and civil, and he viewed their relationship in what we might describe as a non-Kantian manner. This

⁶² Immanuel Kant, *Metaphysische Anfangsgründe der Naturwissenschaft* (Riga: Johann Friedrich Hartknoch, 1786), quotation from Kant, *Metaphysical Foundations of Natural Science*, trans. E. B. Bax (London, 1883), Preface, p. 140; and Buffon, “Époques de la nature,” in *Histoire naturelle*, Vol. 34, p. 1.

process of cross-determination humanized the natural sciences and naturalized the human sciences. Buffon worked at a level prior to any dichotomy between society and nature or the moral and the physical. The concept of monuments enabled him to regard nature and society together, in a way very similar to Montesquieu's contemporary attempt in *De l'esprit des lois* (1748).⁶³

A closer examination may be helpful. Montesquieu's conception of the law made no distinction between civil and natural laws: "Laws, in their most general signification, are the necessary relations [*rappports nécessaires*] arising from the nature of things." This definition showed that every law was not an essence but a "necessary relation" that had to be produced. The law "arises" (*dérive*) and could therefore be considered as the result of a process, not as a principle: during its "arising," or "derivation," various factors could interfere and affect the result. In other words, if laws arose, then legislators could transform them. Knowing this, Montesquieu, in a Baconian fashion, developed a sort of "legal technology": knowledge of the process necessarily gave people the ability to interact with the law. As a developing relationship among various factors, law was not atemporal and intangible: it was always and nothing but the product of a system of constraints. Considering these points, Montesquieu could not isolate civil laws from other types of regulation and legislation: "all beings have their laws"—from the Almighty Creator to the tiniest creature, from "physical" bodies to "moral" entities. This meant nothing more than that there were different kinds of relations between different creatures—beasts, mankind, and angels ("intelligences superior to man").⁶⁴ Even God acted in observance of the constant rules of his being.

Buffon's method of studying nature (looking for monuments and archives), like Montesquieu's way of analyzing the system of the laws, could be understood as a form of Spinozian treatment of phenomena. In Chapter 7 of his *Tractatus theologico-politicus*, Spinoza declared: "For the method of interpreting Scripture is not different from the method of interpreting Nature, and is in fact in complete accord with it." The model that Spinoza described here was precisely a conception of history: "For the method of interpreting nature consists essentially in composing a detailed study of nature from which, as being the source of our assured data, we can deduce the definitions of the things of Nature."⁶⁵ In the same manner, the interpretation of nature, of laws, or of Divine Scripture had to rest on the solid ground of firm data and principles.

BUFFON AND THE EPICUREAN REDUCTION OF THE MORAL TO PHYSIQUE

Buffon's move toward civil history shared a feature with physico-theology and providentialism: they all used the concept of "monuments." Buffon referred to the very same fact (namely, the presence of seashells on mountaintops) that had been interpreted by Woodward and Scheuchzer as proof of the biblical universal Flood. Far from reproducing the theological argument, however, Buffon offered a new interpretation of this fact. Buffon's

⁶³ See Peter Hanns Reill, "Vitalizing Nature and Naturalizing the Humanities in the Late Eighteenth Century," *Studies in Eighteenth Century Culture*, 1999, 28:361–381; Reill, *Vitalizing Nature in the Enlightenment* (Berkeley/Los Angeles: Univ. California Press, 2005); and Francine Markovits, "Althusser et Montesquieu," in *Althusser philosophe*, ed. Pierre Raymond (Paris: Presses Univ. France, 1997), pp. 31–74.

⁶⁴ Charles Secondat, baron de la Brède et de Montesquieu, *De l'esprit des lois* (1748), Bk. 1, Ch. 1: "Des lois, dans le rapport qu'elles ont avec les divers êtres."

⁶⁵ Baruch Spinoza, *Tractatus theologico-politicus* (Hamburg: Apud Heinricum Künraht, 1670), trans. Samuel Shirley (Leiden/New York: Brill, 1989), Ch. 7: "On the Interpretation of Scripture," p. 141.

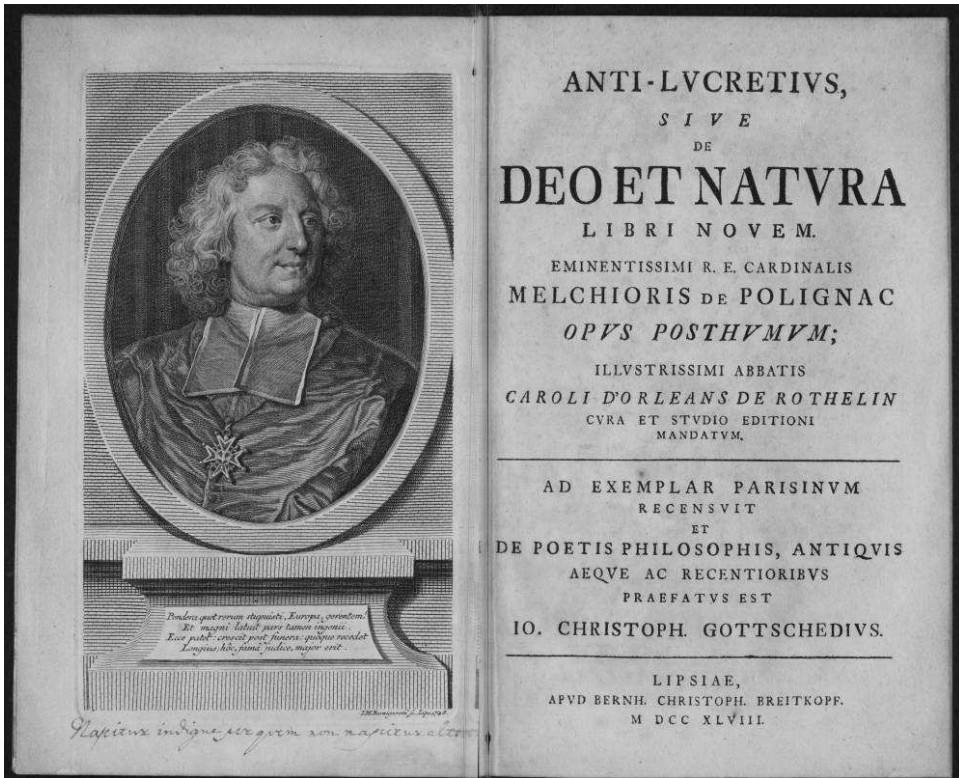


Figure 5. Polignac's *Anti-Lucrèce*. M. de Polignac, *Anti-Lucretius, sive de Deo et Natura* (Lipsiae: C. Breitkopf, 1748). © MPIWG, Berlin. Melchior de Polignac (1661–1741), a follower of Bossuet at the Académie Française, was also a member of the Académie des Sciences and the Académie Royale des Inscriptions et Belles-Lettres. He dedicated thousands of verses to a refutation of Epicureanism (*Anti-Lucretius*), which was published after his death by the abbé de Rothelin and translated into French in 1749 by Jean-Pierre de Bougainville, Perpetual Secretary of the Académie Royale des Inscriptions et Belles-Lettres. Buffon's first volumes of the *Histoire naturelle* were published the same year, and Lelarge de Lignac called him "the Anti-Polignac."

monuments were not to be confused with *reliquiae diluvianae*: rather, they belonged to an Epicurean constellation of theses. Seashells, in short, took on a radically different meaning in a different context.⁶⁶ Unfettered by the theological model of the Book of Nature (written in mathematical signs that had to be deciphered), Buffon's conception of natural history involved a historical habit of posing questions in terms of archives and documents.

Because of his physical theories Buffon was accused of Epicureanism. Lelarge de Lignac coined the term "Anti-Polignac" to describe the first volumes of the *Histoire naturelle*, in reference to Cardinal Polignac's 1748 book *Anti-Lucretius*.⁶⁷ (See Figure 5.) The play of the double negatives cast Buffon as a vindicator of Lucretius. He was therefore accused of giving new strength to religion's opponents, the Epicureans. Al-

⁶⁶ This was a characteristic play in libertine writings. See Olivier Bloch, "La technique du collage dans la tradition libertine et clandestine," *La Lettre Clandestine*, 2000, 9:127–142.

⁶⁷ Melchior, Cardinal de Polignac, *L'Anti-Lucrèce: Poème sur la religion naturelle*, trans. Jean-Pierre Bougainville, 2 vols. (Paris: H. & J. Guérin, 1749); and Lelarge de Lignac, *Lettres à un Amériquin* (cit. n. 5).

though “Epicureanism” could have various meanings, in a polemical setting it became an accusation. It described a physical theory that led to atheism, insofar as every phenomenon was reduced to its merely physical or material dimension. It also meant that all sciences were reduced to physique (or natural history), the source from which they had sprung. The core of this philosophy—Epicurean physics—put forward an antiteleological atomism within which chance played a critical role in the emergence of (new life) forms.

On the most general level, Epicureanism challenged the idea of Providence. More specifically, it questioned two different varieties of teleology: the overall external (Platonic) teleology and the internal (Aristotelian) one. Providentialism, the system opposed to Epicureanism, entailed a universal Logos that ordered everything for the best. The providentialist perspective held that we can infer the existence of God from the observation of various natural beings. It led to what Kant, in critical terms, called a “physico-theological proof” of God’s existence. Epicureanism confronted this view, arguing that nature was not synonymous with pure beauty, wisdom, or perfect economy. The existence of harmony was nothing more than the unexpected effect of disruptive breaks, the result of the counteraction of various opposing forces. Buffon was Epicurean in the sense that he pictured nature in a state of continual ruptures of balance, of permanent flow: “Nature, I allow, is in a perpetual state of fluctuation: but it is enough for man to seize her in his own age, and to look backward and forward, in order to discover her former condition, and what future appearance she may probably assume.” This attitude was clearly demonstrated in Buffon’s natural history of “The Hare.” This section of the *Histoire* contained several remarks about the hare’s reproductive power and the way different factors were balanced in nature with the help of human intervention. There were simultaneously at work great forces for creation or increase and great forces for destruction—or, as Buffon put it instead, forces “to alter and undo, to develop and to renew,” since “creation and destruction are the attributes of [God’s] omnipotence.”⁶⁸

Epicureanism also confronted internal teleology, the idea of organisms as coherent wholes designed by a *Summus Artifex*. During the early modern era it was popularly asserted that tossing a complete set of individual letters in the air could not produce the *Iliad*. The implied analogy suggested that in both cases there had to be an organizing intelligence at work. In the natural history of “The Hog, the Hog of Siam, and the Wild Boar” Buffon undermined this thesis. As Samuel Butler phrased it, “the presence of rudimentary organs under a pig’s hoof suggests an attack upon the doctrine of final causes in so far as it pretended that every part of every animal or plant was specially designed with a view to the wants of the animal or plant itself once and for ever throughout all time.” Buffon opined that “everything which is not so hostile as to destroy, everything that can subsist in connection with other things, does actually subsist: And, perhaps, in most beings, there are fewer relative, useful, or necessary parts, than those which are indifferent, useless, or redundant.” Nature’s plenitude covered everything possible; “it would appear that everything that can be, is [*il semble que tout ce qui peut être, est*].”⁶⁹ (See Figure 6.)

The Epicurean world was active, full of elements whose combinations actually pro-

⁶⁸ Buffon, “Animaux communs aux deux continents,” in *Histoire naturelle*, Vol. 9, p. 127; Buffon, “Le lièvre,” *ibid.*, Vol. 6, p. 252; and Buffon, “Première vue,” *ibid.*, Vol. 12 (1764), p. iv.

⁶⁹ Butler, *Evolution, Old and New* (cit. n. 3), p. 85; Buffon, “Le cochon, le cochon de Siam, et le sanglier,” in *Histoire naturelle*, Vol. 5 (1755), p. 104; and Buffon, “Premier discours,” in Buffon, *Histoire naturelle*, Vol. 1, p. 11.

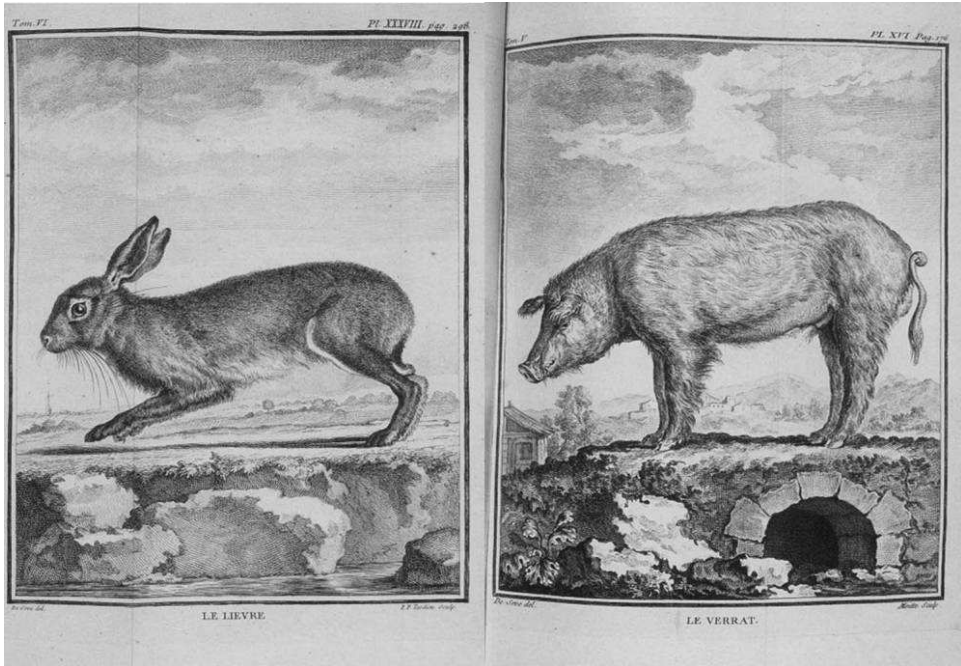


Figure 6. Buffon's hog and hare. Buffon, "Le verrat," *Histoire naturelle*, Volume 5 (1755), Plate 16; "Le lièvre," Volume 6 (1756), Plate 38. © Gallica, Bibliothèque Nationale de France, Paris. Buffon constantly uses his monographs on various animals to make general statements about his conception of nature. In his article on "The Hog," he claims that "everything that can be, is," suggesting that nature produces every possible creature before disposing of the less viable ones—a cruel process that nonetheless preserves a lot of clumsy beings. In "The Hare," he reinterprets the seemingly providential harmony of natural populations in terms of a balance between an excess of production and an excess of destruction.

duced novelty, whereas according to the providentialist perspective the world stayed passive, without any true generation, because God's wisdom had foreseen, once and for all, each and every production among the creatures. Epicurean physique made up every single being via combinations of numbers of various microscopic parts, whereas providentialism emphasized essences and substances. Buffon's conception of nature lay somewhere in between: it was Epicurean with its flow of "organic molecules," yet essentialist with its "*moules intérieures*" defining the species and integrating the molecules into shape.

Buffon could relate to the Epicurean view of composition in several ways. His conception of mathematics as an unreal set of abstract ideas could certainly be ascribed to Epicurean sources. His theory of the formation of individual bodies ambiguously implied *both* the organization of thousands of minute particles (the organic molecules) *and* the presence of an eternal form (the *moules intérieures*). His theory of the origins of the Earth pointed to an explicitly antiteleological pattern, expelling God from the system and calling him a hypothesis that had to be avoided. In place of God, Buffon resorted to the hypothesis of a physical agent—a comet—ruled by a physical force—attraction. And in Buffon's day attraction was very likely to be read as a new version of Epicurean chance. Modern atheists no longer referred to chance, the way the ancients had, but instead referred to nature's laws. In parallel to physico-theological interpretations by William Derham and the like, the Newtonian cosmology, too, was suspected of Epicureanism because it implied

the existence of a vacuum. The laws of nature, traditionally presented by John Ray or Nicolas Malebranche as proof of God's perfection or wisdom, were now held to be a refutation of Providence: their constant activity was a guarantee for the physicist that no divine guidance was required in the course of natural events. If chance still played a role in this new materialistic framework, it was to be found in the system's origins: the blind source (no Wise Architect) at the origin of the world's design.⁷⁰ Around 1750, the word "Epicureanism" was a way to epitomize and at the same time criticize a so-called atheistic view of nature and culture, opposing it to the allegedly "true" and providentialist philosophy of the Christian believer. Newtonian cosmology, with its emphasis on the laws of nature, could be interpreted in either way. The clockwork universe could be praised either as an indication of the Creator's wisdom or as the depiction of a mechanical material device.

If Epicurean philosophy started with a careful study of the laws of matter, it placed *physique* at its center. The science of natural beings, which Buffon called natural history, formed a firm foundation for philosophy, replacing logic or metaphysics, which pointed to the immaterial soul or to God as the first principle. Hence Buffon's *Histoire naturelle* could be read as a physical theory that refuted the validity of autonomous moral considerations. This theory took several forms. For example, his natural history of mankind, in considering every fact in both its physical and moral aspects, worked in two different ways:

(a) Some (physicized) moral beliefs were examined in order to bring them back to their true (moral) nature. For instance, according to Buffon, virginity was but a product of human fancy and there was no such thing as a "hymen" in the female anatomy. Natural history's role was to identify such so-called organs as mere embodiments of mental or moral prejudices and then discard them.⁷¹

(b) Symmetrically, many "moral" beliefs had to be reinterpreted according to their true physical nature. Circumcision, for instance, was practiced on religious grounds, whereas it was rather (according to Buffon) a physical necessity. If they were not properly circumcised, he held, some men would not be able to mate and generate offspring.

There was, in fact, a kind of inner contradiction in Buffon's system. In a very Epicurean way, he combined the moral and the physical into a single reality; but at the same time, within this physico-moral whole, he gave priority to one aspect—the physical. In his *Natural History*, moral beliefs were reduced to their physical foundations. In other words, if Buffon was using the term "history" in the sense of a description of the habits of the various species, his program was actually related to the knowledge of the anatomical parts and the inner structure of each animal. As he stated in his description of the *unau* or *ai*: "in physique, evil is restrained to its most narrow extent."⁷² The true *physique* was the material one.

⁷⁰ Charles Secondat, baron de la Brède et de Montesquieu, *Spicilège*, in *Oeuvres complètes*, ed. Roger Caillois (Bibliothèque de la Pléiade), 2 vols. (Paris: Gallimard-NRF, 1949–1951), Vol. 2, pp. 1382–1383: "An impious man said that no man had ever been so crazy as to say that chance had produced the world; that everybody knew that not even a leaf could be made by means of natural causes or laws. . . . But one can reply: who established those laws of nature? A blind power."

⁷¹ See Buffon, "De la puberté," in *Histoire naturelle*, Vol. 2 (1749), p. 494. Buffon always refers to the alleged "hymen" as "*caroncules myrtiformes*." This choice of vocabulary allowed him to discard the fanciful goddess of "virginity." If there was a physical manifestation of virginity, it was nothing but some fleshy protuberances and rough patches in the vagina.

⁷² Buffon, "L'unau ou ai," in *Histoire naturelle*, Vol. 13 (1765), p. 41.

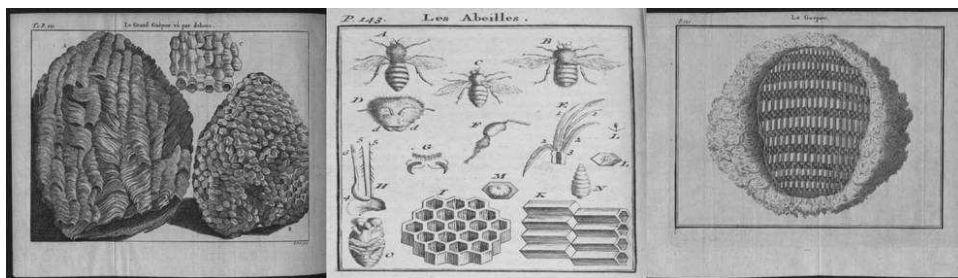


Figure 7. *Pluche's bees and wasps.* Noël-Antoine Pluche, *Le spectacle de la nature, ou Entretiens sur les particularités de l'Histoire naturelle, qui ont paru les plus propres à rendre les jeunes gens curieux, et à leur former l'esprit* (1732–1750). © MPIWG, Berlin. Noël-Antoine Pluche (1688–1761) was a pedagogue and a popularizer of natural history. His *Spectacle* ranked among the most popular books in eighteenth-century private libraries. It spread the spirit of physico-theology to a large audience. The description of the beehive was a topos of this moral tradition. In more than one way, Buffon's *Histoire naturelle* can be read as the anti-Spectacle: for Buffon, the beehive is ruled only by mechanical constraints.

Buffon denied any relevance to final causes and reinterpreted the classical *topoi* of the moral tradition. Insects, for example, were often taken as a source for political models. The peaceful kingdom of bees counterbalanced the society of wasps. For Pluche, the beehive embodied a society where individuals were ready to sacrifice their own good and interests for the sake of the community, caring for “economy, police, and attention paid to the work.” Wasps, on the contrary, were depicted as “the pirates and the cannibals of the flying nation [*les boucannières ou les anthropophages du peuple mouche*],” killing and robbing like Europeans.⁷³ (See Figure 7.) Buffon stingingly rebuked those moral interpretations. The form of the cells in a beehive was a purely physical phenomenon; it did not exhibit any intelligence but was the simple result of geometrical constraints, “independently of any view, any knowledge, any reflection.”⁷⁴

This reduction of moral entities to physical relationships was also very clear in Buffon's attempt to pave the way for a new metaphysics. He described the body and the soul not as opposite substances but as mutually comparable entities. In his text *On Human Nature*, Buffon clearly presented two opposed ways of knowing the body and the soul. The first, called the “way of negation” (*voie de négation*), stated that when someone attributed a specific feature to one of the substances, he or she must symmetrically attribute the opposite feature to the second substance. For instance, if one qualified the body as *material, extended, divisible*, he would have said nothing about the soul other than that it was *immaterial, unextended, indivisible*. This negative logic related to the role played by “real distinction” in Cartesian metaphysics. It was distinguished from Buffon's own “way of comparison.” Comparison was, in fact, the essence of Buffonian metaphysics. It consisted of attributing positive properties to both sides in a comparison. The soul could be said to be *simple, general, constant*, and the body *divisible, destructible, extended*. The soul *commanded* and the body *obeyed*. The soul *could merge* with anything; bodies always

⁷³ Pluche, *Spectacle de la nature* (cit. n. 8), Vol. 1, pp. 130, 142. See Francine Markovits, “Nature et institutions au XVIII^e siècle,” in *L'univers philosophique*, ed. André Jacob (Paris: Presses Univ. France, 1989), pp. 443–454.

⁷⁴ Buffon, “Discours sur la nature des animaux,” in *Histoire naturelle*, Vol. 4 (1753), p. 94. This was a claim that would be taken up in D'Arcy Thompson's *On Growth and Form* (1910).

collided with each other and were *unable to unite* with anything.⁷⁵ Buffon claimed that his comparative method produced a much larger array of properties than the negative reasoning of traditional Cartesian metaphysics.

COMPARATIVE NATURAL HISTORY AS THE TRUE PHYSIQUE

This Epicurean physique was neither a mathematization nor a deification of nature. “Nature” remained for Buffon a polysemous term (he finally gave up on contributing the entry on “Nature” for the *Encyclopédie*). He subscribed neither to the ideal of an *a priori* knowledge of the laws of nature nor to a mathematically founded rational mechanics. The method that he called “comparison” expressed a natural history that drew from Galilean and Newtonian quantified physics. Nature, as Buffon described it, was a body of laws, yet laws did not necessarily take a mathematical guise: they were “general effects,” law-like relations discovered by way of comparison. In stark Lockean fashion, Buffon’s *Natural History* abandoned all contact with substances and real essences.

In Buffon, the laws of nature lacked the Cartesian characteristics of clarity and distinctness of necessary truths. But the failure of the Cartesian method was a consequence of the strong belief that the world’s system could be reached by the exclusive operation of the mind, guided by the principles of logic. Buffon found a way for natural laws, given both a general form and some reality, to exist between the two symmetrical shoals of the nebulae of imaginary fancies and the infinite heap of particular facts. The idea of generality, intrinsically linked to the concept of law, was produced from the repetition and collection of singular events, which anchored laws in the real world of constant and concrete phenomena.

History was, in the Buffonian context, an epistemological concept: a specific way to document science and provide it with a certain kind of evidence, necessarily aiming for a general (philosophical) end. If it had to be viewed in a temporal fashion, history relied on describing various *époques*, depicting *grands tableaux* and attributing a definite order to the series of events, rather than on the Romantic eschatological scheme of a progressive development of things. Buffon tried to identify monuments rather than deal with an indefinite time running through eternity. His experiments on metal globes should be understood in this perspective: they were instruments for documenting various states of nature by way of comparison. Buffon’s natural history did not deal with our physical or biological concepts (time or evolution). On the logical basis of comparison, Buffon built a relational ontology and rejected the mathematical conception of physique, which proceeded by proofs, quantifications, and demonstrations. He developed a positive conception of the plurality of truths, involving *physical certainties* derived from studies of historical and judicial probabilities. Physique, thus defined, was a science devoted to the description of the relationships between nature and us, on the one hand, and among nature’s various productions, on the other. Following neither the path of the mechanization of the world picture nor that of the progress of the “quantifying spirit,” eighteenth-century natural sciences opened a different road.

Linking the judicial to the physical, or drawing a parallel between natural and civil history (in contrast to Kant, who defined nature and liberty as two different kingdoms), Buffon, like Montesquieu, does not fit into the Cassirerian perspective of the Enlighten-

⁷⁵ Buffon, “De la nature de l’homme,” in *Histoire naturelle*, Vol. 2, pp. 434–435 (way of negation), 435–436 (way of comparison); and Hoquet, *Buffon* (cit. n. 17), Ch. 16.

ment. The *Histoire naturelle* should be understood in light of the materialistic and Epicurean trends that pervaded the Enlightenment. The Kantian idea of a discontinuity between nature and culture was not relevant in the thought of those Epicurean philosophers, whose work exemplified the remnant of skeptical or nominalist themes within the “Enlightenment project.”

Besides, if nature, as a whole, was the body of laws that ruled over interconnected beings, it expelled moral considerations from the sphere of physical knowledge. Buffon’s method of comparison stated that no absolute essence standing by itself could be known or understood; the only things we are able to know must bear a link to us and are therefore susceptible to comparison. No knowledge could be prior to experience, and therefore natural history was an atheistic science. Since God was the infinite being, he was in no way comparable or reducible to finite creatures. And, having no relation to natural creatures, this incomparable God could not play the role of a causal factor in scientific explanations—this axiom of incomparability was a replay of Epicurus’s second maxim: “What cannot be felt is nothing to us.” If the mystery of creation or speculation about the origins of things was not within science’s legitimate territory, God could be expelled from physique.

Nonetheless, Buffon did not defend his theory as positively atheistic. He constantly affirmed that some beings were beyond the reach of human knowledge, warning his fellow naturalists: Let the Flood be a miracle. Do not try, as Thomas Burnet and William Whiston did, to explain miracles by physical reasons; and do not try, either, to explain physical facts by way of miracles. Miracles were what they were: quick interventions of God in the course of ordinary events. They implied nothing about the physical world, and they left no traces behind. Miracles were not natural; they did not leave any “monuments”; they were outside the reach of natural history and should be expelled from *la vraie physique*.

Contrary to this view, physico-theology stated that God should never be expelled from any kind of science and that his role could be demonstrated through the course of history by the collection of monuments. The remains of the Flood, like the first copies of the apostles’ writings and precious relics of the Holy Cross, had to be recognized and affirmed by a continuous chain of witnesses. As the early nineteenth-century Oxford geologist William Buckland expressed it, Christian science had to “throw new light on a period of much obscurity in the physical history of our globe” and, “by affording the strongest evidence of an universal deluge,” show that “geology supplies . . . proofs of an event in the reality of which the truth of the Mosaic records is so materially involved.”⁷⁶ Buffon, in contrast, challenged the very possibility of “natural miracles” and of “theological monuments.” Nothing immanent in this world bore a single trace of a transcendent God, and natural history should work like civil history. If the collection of facts was the first step toward a Baconian discovery of natural laws and toward a natural philosophy, then no divine operation in the course of natural events was to be surmised or sought. Buffon’s polemical stance can therefore be understood in its full force; there is no need to consider him a precursor to Darwin or a discoverer of time.

Did this conception of natural history have any impact? If nineteenth-century physicists did not take this historical, atemporal, and nonmathematical path, Buffon’s concept of the true physical science was nonetheless not entirely lost to posterity. T. H. Huxley paid great

⁷⁶ Buckland, *Reliquiae diluvianae* (cit. n. 61), p. iii. For the role of facts in apologetics see, e.g., Alexandre Claude François Houtteville, *La religion chrétienne prouvée par les faits* (1722), new ed., 3 vols. (Paris: Le Mercier & Boudet, 1740).

tribute to Buffon's concept of monuments. Ernst Haeckel, though he never actually mentioned Buffon, also tried to develop the idea of the natural sciences as an intermediate body of science between the mathematical and the historical sciences.⁷⁷ Buffon's blurring of the severance between history and philosophy might also be echoed in words George Romanes used to describe Darwin:

While to them [i.e., the predecessors] the discovery or accumulation of facts was an end, to him it is the means. In their eyes, it was enough that the facts should be discovered and recorded. In his eyes the value of facts is due to their power of guiding the mind to a further discovery of principles. And the extraordinary success which attended his work in this respect of *generalization* immediately brought natural history into line with the other inductive sciences, behind which, in this most important of all respects, she has so seriously fallen.⁷⁸

Buffon can be seen as a good example of the type of "philosophical naturalist" so important to Darwin's own conception of science.⁷⁹ More surprisingly, Buffon's lay position, so controversial in his own time, would also be adopted in the following century as an orthodox conception by Oxbridge dons and other Christian writers like John Herschel and William Whewell.⁸⁰ If each philosopher organized the divisions of the sciences in a specific way, Buffon's historical conception of physique, both natural and civil, seems to have paved the way for various interpretations of the relations of science and religion or nature and society.

⁷⁷ See Thomas Henry Huxley, "The Rise and Progress of Palaeontology," in *Science and Hebrew Tradition* (London: Macmillan, 1893), essay no. 2; and Ernst Haeckel, *Die heutige Entwicklungslehre im Verhältnisse zur Gesamtwissenschaft* (Vortrag in der ersten öffentlichen Sitzung der fünfzigsten Versammlung deutscher Naturforscher und Aerzte zu München am 18. September 1877) (Stuttgart: E. Schweizerbart'sche Verlagshandlung, 1877).

⁷⁸ Georges John Romanes, *Darwin and After Darwin, an Exposition of the Darwinian Theory and a Discussion of Post-Darwinian Questions*, 3 vols. (London: Longmans, 1892–1897), Vol. 1, p. 5.

⁷⁹ Phillip Reid Sloan, "The Making of a Philosophical Naturalist," in *The Cambridge Companion to Darwin*, ed. Jonathan Hodge and Gregory Radick (Cambridge: Cambridge Univ. Press, 2003), pp. 17–39.

⁸⁰ As David L. Hull put it, although he did not here refer to Buffon: "What these pious men Herschel, Whewell and Mill did not perceive was that by removing God as an active agent and relegating him to the position of the divine author of immutable laws, they were preparing the way for his total expulsion from science. Like Kant's *Ding an sich*, he was becoming remote, obscure, unknowable, somehow underlying everything and very important, but of no conceivable consequence for any particular scientific investigation." See Hull, "Charles Darwin and Nineteenth-Century Philosophies of Science," in *Foundations of Scientific Method: The Nineteenth Century*, ed. Ronald N. Giere and Richard S. Westfall (Bloomington/London: Indiana Univ. Press, 1973), pp. 115–132, on p. 123.